Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

1. Approximate the number using a calculator.

$9^{2.6}$

$9^{2.6} \approx$ ☐ (Round to three decimal places.)

2. Approximate each number using a calculator.

$2^{\sqrt{5}}$

$2^{\sqrt{5}} \approx$ ☐ (Round to three decimal places.)

3. Graph the given function by making a table of coordinates.

$f(x) = 4^x$

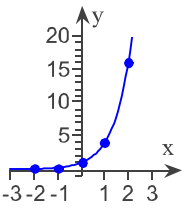
Complete the table of coordinates.

x	−2	−1	0	1	2
y	☐	☐	☐	☐	☐

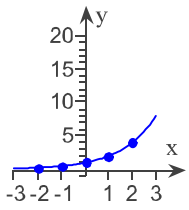
(Type integers or fractions. Simplify your answers.)

Choose the correct graph below.

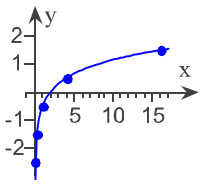
○A.



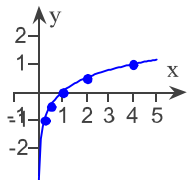
○B.



○C.



○D.

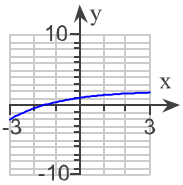


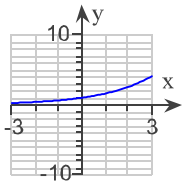
Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

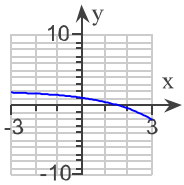
4. Graph the following function by making a table of coordinates. If applicable, use a graphing utility to confirm your hand-drawn graph.

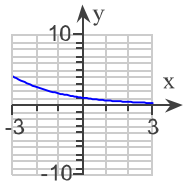
$$g(x) = \left(\frac{8}{5}\right)^x$$

Choose the correct graph below.

○A. 

○B. 

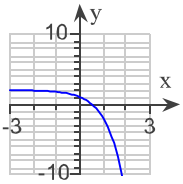
○C. 

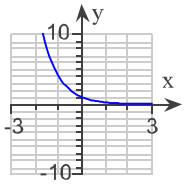
○D. 

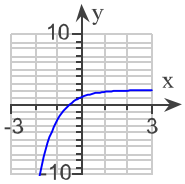
5. Graph the following function by making a table of coordinates. If applicable, use a graphing utility to confirm your hand-drawn graph.

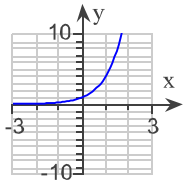
$$f(x) = (0.25)^x$$

Choose the correct graph below.

○A. 

○B. 

○C. 

○D. 

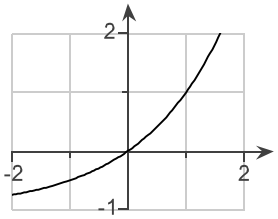
6. Match the graph to one of the following functions.

$y = 2^x$ $\quad y = 2^{-x}$

$y = -2^x$ $\quad y = -2^{-x}$

$y = 2^x - 1$ $\quad y = 2^{x-1}$

$y = 2^{1-x}$ $\quad y = 1 - 2^x$



Which function is represented by the graph?

○A. $y = 2^x - 1$ ○B. $y = -2^x$

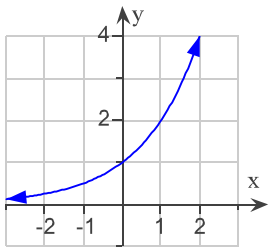
○C. $y = 2^{1-x}$ ○D. $y = 2^x$

○E. $y = -2^{-x}$ ○F. $y = 2^{-x}$

○G. $y = 2^{x-1}$ ○H. $y = 1 - 2^x$

Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

7. The graph of an exponential function is given to the right. Select the function for the graph from the following options.



$f(x) = 2^x$, $g(x) = 2^{x-1}$, $h(x) = 2^x - 1$,
$F(x) = -2^x$, $G(x) = 2^{-x}$, $H(x) = -2^{-x}$

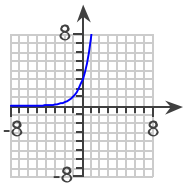
Which function is represented by the graph?

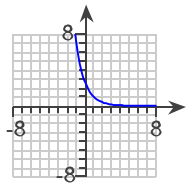
- A. $g(x) = 2^{x-1}$
- B. $H(x) = -2^{-x}$
- C. $h(x) = 2^x - 1$
- D. $G(x) = 2^{-x}$
- E. $f(x) = 2^x$
- F. $F(x) = -2^x$

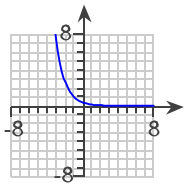
8. Use transformations of the graph of $f(x) = e^x$ to identify the graph of the function given below. Use the graph to determine its domain, range, and asymptote.

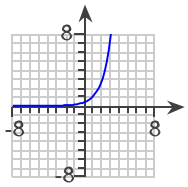
$g(x) = e^{x+1}$

Identify the graph of $g(x) = e^{x+1}$.

A.


B.


C.


D.


What is the domain of $g(x) = e^{x+1}$?

☐ (Use interval notation.)

What is the range of $g(x) = e^{x+1}$?

☐ (Use interval notation.)

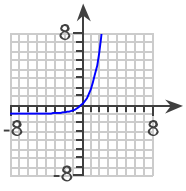
What is the horizontal asymptote of $g(x) = e^{x+1}$?

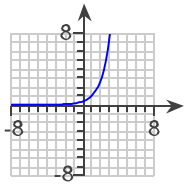
$y =$ ☐

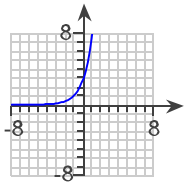
9. Use transformations of the graph of $f(x) = e^x$ to identify the graph of the function given below. Use the graph to determine its domain, range, and asymptote.

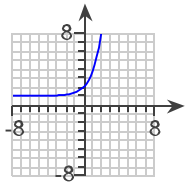
$g(x) = e^x - 1$

Identify the graph of $g(x) = e^x - 1$.

○ A. 

○ B. 

○ C. 

○ D. 

What is the domain of $g(x) = e^x - 1$?

☐ (Use interval notation.)

What is the range of $g(x) = e^x - 1$?

☐ (Use interval notation.)

What line is the horizontal asymptote of $g(x) = e^x - 1$?

$y =$ ☐

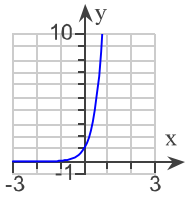
Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

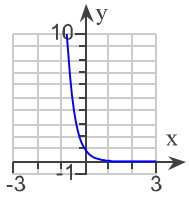
10. The accompanying figure shows the graph of $f(x) = e^x$. Use transformations of this graph to graph the function given below. Give the equation of the asymptote. Use the graph to determine the function's domain and range.

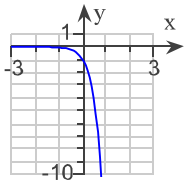
$h(x) = -e^{3x}$

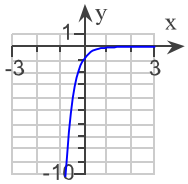
Click the icon to view the graph of $f(x) = e^x$.

Graph the function $h(x) = -e^{3x}$. Choose the correct graph below.

A. 

B. 

C. 

D. 

What is the horizontal asymptote of $h(x) = -e^{3x}$?

$y =$ ☐

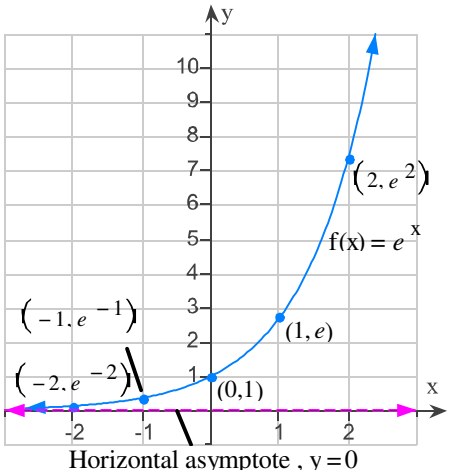
What is the domain of $h(x) = -e^{3x}$?

☐ (Type your answer in interval notation.)

What is the range of $h(x) = -e^{3x}$?

☐ (Type your answer in interval notation.)

More Info

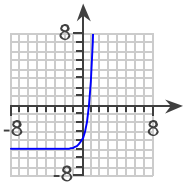


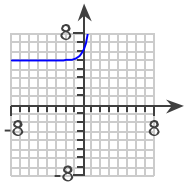
Horizontal asymptote , $y = 0$

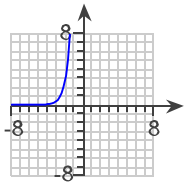
11. Use transformations of the graph of $f(x) = e^x$ to identify the graph of the function given below. Use the graph to determine its domain, range, and asymptote.

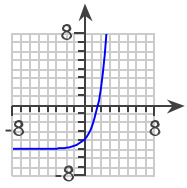
$g(x) = e^{2x} - 5$

Identify the graph of $g(x) = e^{2x} - 5$.

○A. 

○B. 

○C. 

○D. 

What is the domain of $g(x) = e^{2x} - 5$?

☐ (Use interval notation.)

What is the range of $g(x) = e^{2x} - 5$?

☐ (Use interval notation.)

What line is the horizontal asymptote of $g(x) = e^{2x} - 5$?

$y =$ ☐

12. Use the compound interest formulas $A = P\left(1 + \frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to solve the problem given. Round answers to the nearest cent.

Find the accumulated value of an investment of $20,000 for 6 years at an interest rate of 6.5% if the money is **a.** compounded semiannually; **b.** compounded quarterly; **c.** compounded monthly **d.** compounded continuously.

a. What is the accumulated value if the money is compounded semiannually?

$☐ (Round your answer to the nearest cent.)

b. What is the accumulated value if the money is compounded quarterly?

$☐ (Round your answer to the nearest cent.)

c. What is the accumulated value if the money is compounded monthly?

$☐ (Round your answer to the nearest cent.)

d. What is the accumulated value if the money is compounded continuously?

$☐ (Round your answer to the nearest cent.)

13. Write the equation in its equivalent exponential form.

$3 = \log_6 216$

What is the equivalent exponential form of the equation?

☐

14. Write the equation in its equivalent exponential form.

$9 = \log_4 M$

What is the equivalent exponential form of the equation?

☐

15. Write the following equation in its equivalent exponential form.

$3 = \log_b 125$

The exponential form is $\square = \square$.
(Type the expression containing b or y on the left side of the equation.)

16. Write the following equation in its equivalent exponential form.

$\log_5 25 = y$

The exponential form is $\square$.
(Type an equation.)

17. Write the equation in its equivalent logarithmic form.

$3^4 = 81$

What is the equivalent logarithmic form of the equation?

$\square$

18. Write in logarithmic form.

$\frac{1}{125} = 5^{-3}$

The logarithmic form is $\square$.
(Use integers or fractions for any numbers in the expression.)

19. Write the following equation in its equivalent logarithmic form.

$\sqrt[4]{16} = 2$

The equation in logarithmic form is $\square$.
(Type an equation.)

20. Write the equation in its equivalent logarithmic form.

$a^2 = 808$

What is the equivalent logarithmic form of the equation?

21. Find the exact value of the logarithm without using a calculator.

$\log_{11} 121$

$\log_{11} 121 =$

22. Evaluate the expression without using a calculator.

$\log_5 \frac{1}{5}$

$\log_5 \frac{1}{5} =$

23. Evaluate the following expression without using a calculator.

$\log_9 (\sqrt{9})$

$\log_9 (\sqrt{9}) =$

24. Evaluate the following expression without using a calculator.

$\log_6 6$

$\log_6 6 =$

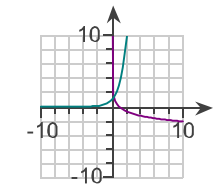
25. Evaluate the expression without using a calculator.

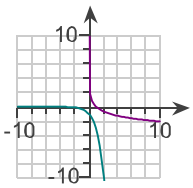
$\log_4 1$

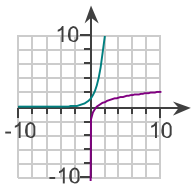
$\log_4 1 =$

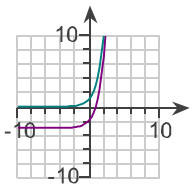
Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

26. Graph $f(x) = 3^x$ and $g(x) = \log_3 x$ in the same rectangular coordinate system.



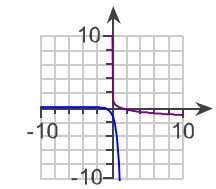


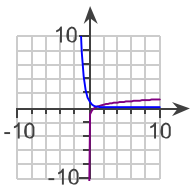


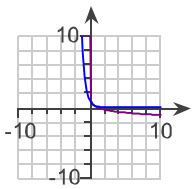


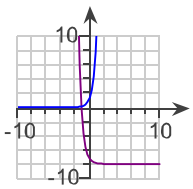
27. Graph $f(x) = \left(\frac{1}{8}\right)^x$ and $g(x) = \log_{1/8} x$ in the same rectangular coordinate system.

Choose the correct graph below.

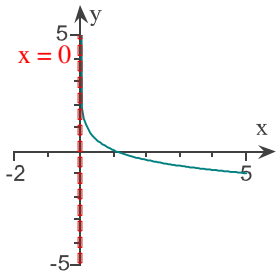
A.


B.


C.


D.


28. The graph of a logarithmic function is given. Match the graph to its function.



Which function matches the graph?

A. $y = \log_5 x$

B. $y = \log_5 (x - 1)$

C. $y = -\log_5 x$

D. $y = 1 - \log_5 x$

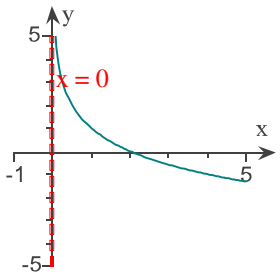
E. $y = \log_5 (-x)$

F. $y = \log_5 x - 1$

G. $y = \log_5 (1 - x)$

H. $y = -\log_5 (-x)$

29. The graph of a logarithmic function is given. Match the graph to its function.

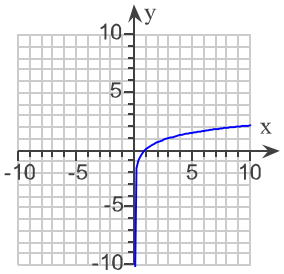


Which function matches the graph?

- ○ $y = 1 - \log_2 x$
- ○ $y = -\log_2 x$
- ○ $y = -\log_2(-x)$
- ○ $y = \log_2(-x)$

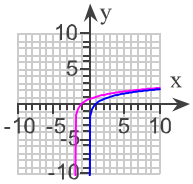
30. The figure on the right shows the graph of $f(x) = \log_3 x$. Use transformations of this graph to graph the given function. Find the graph's vertical asymptote, domain, and range.

$$h(x) = \log_3(x+2)$$

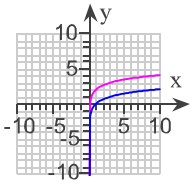


a.) What is the graph of the two functions?

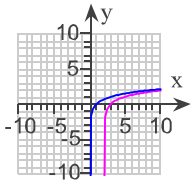
○A.



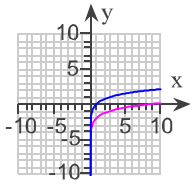
○B.



○C.



○D.



b.) What is the vertical asymptote of the shifted function, $h(x)$?

$x =$ ☐

c.) What is the domain of $h(x)$?

The domain is ☐.
(Type your answer in interval notation.)

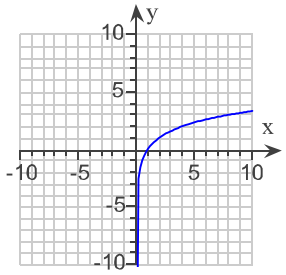
d.) What is the range of $h(x)$?

The range is ☐.
(Type your answer in interval notation.)

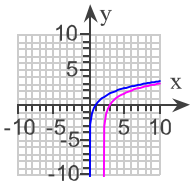
Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

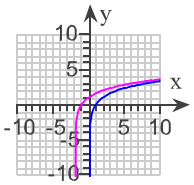
31. The figure on the right shows the graph of $f(x) = \log_2 x$. Use transformations of this graph to graph the given function. Find the graph's vertical asymptote, domain, and range.

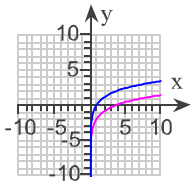
$$g(x) = 2 + \log_2(x)$$

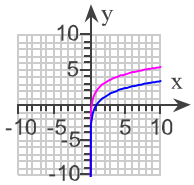


a.) What is the graph of the two functions?

○A. 

○B. 

○C. 

○D. 

b.) What is the vertical asymptote of the shifted function, $g(x)$?

$x =$ ☐

c.) What is the domain of $g(x)$?

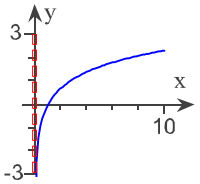
The domain is ☐.
(Type your answer in interval notation.)

d.) What is the range of $g(x)$?

The range is ☐.
(Type your answer in interval notation.)

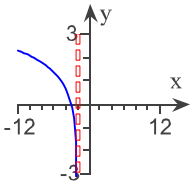
Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

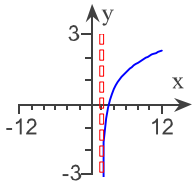
32. The figure shows the graph of $f(x) = \ln x$. Use transformations of this graph to graph the function below. Graph and give the equation of the asymptote. Use the graph to determine the function's domain and range.

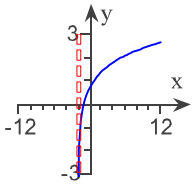


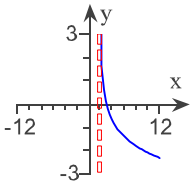
$g(x) = \ln(x+2)$

Which is the graph of $g(x) = \ln(x+2)$?

A.


B.


C.


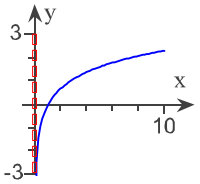
D.


The vertical asymptote of $g(x) = \ln(x+2)$ is $x =$ ☐.

The domain of $g(x) = \ln(x+2)$ is ☐. (Type your answer in interval notation.)

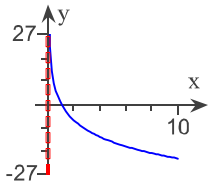
The range of $g(x) = \ln(x+2)$ is ☐. (Type your answer in interval notation.)

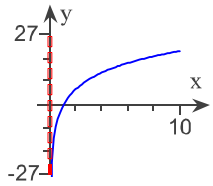
33. The figure shows the graph of $f(x) = \ln x$. Use transformations of this graph to graph the function below. Graph and give the equation of the asymptote. Use the graph to determine the function's domain and range.

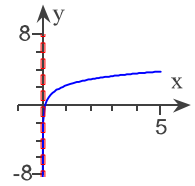


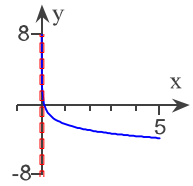
$g(x) = \ln(9x)$

Which of the following is the graph of $g(x) = \ln(9x)$?

A.


B.


C.


D.


The vertical asymptote of $g(x) = \ln(9x)$ is $x =$ ☐.

The domain of $g(x) = \ln(9x)$ is ☐. (Type your answer in interval notation.)

The range of $g(x) = \ln(9x)$ is ☐. (Type your answer in interval notation.)

34. Find the domain of the logarithmic function.

$f(x) = \log(3 - x)$

The domain of $f(x) = \log(3 - x)$ is ☐.
(Type your answer in interval notation.)

35. Write the equation in its equivalent exponential form. Then solve for x.

$\log_3(x - 4) = 4$

$\log_3(x - 4) = 4$ in its equivalent exponential form is ☐. (Do not simplify.)

x = ☐

36. Write the equation in its equivalent exponential form. Then solve for x.

$\log_9 x = -2$

$\log_9 x = -2$ in its equivalent exponential form is ☐. (Do not simplify.)

x = ☐

37. Find the domain of the logarithmic function.

$f(x) = \ln(x^2 + 2x - 8)$

The domain of f is ☐. (Type your answer in interval notation.)

38. Find the domain of the logarithmic function.

$f(x) = \log\left(\frac{x + 7}{x - 1}\right)$

The domain of f is ☐. (Type your answer in interval notation.)

39. The loudness level of a sound, D, in decibels, is given by the formula $D = 10 \log (10^{12} I)$, where I is the intensity of the sound, in watts per meter^2. Decibel levels range from 0, a barely audible sound, to 160, a sound resulting in a ruptured eardrum. The sound of a certain animal can be heard 500 miles away, reaching an intensity of 9.6×10^6 watts per meter^2. Determine the decibel level of this sound. At close range, can the sound of this animal rupture the human eardrum?

The decibel level of this animal's sound is approximately ☐ decibels.
(Round to the nearest whole number as needed.)

At close range, can the sound of this animal rupture the human eardrum?

- ○ Yes, the sound can rupture the human eardrum.
- ○ No, the sound cannot rupture the human eardrum.

40. Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$\log_2(7 \cdot 3)$

$\log_2(7 \cdot 3) =$ ☐

41. Use properties of logarithms to expand each logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_7\left(\frac{7}{y}\right)$

$\log_7\left(\frac{7}{y}\right) =$ ☐

42. Use properties of logarithms to expand the logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\ln\left(\frac{e^4}{13}\right)$

$\ln\left(\frac{e^4}{13}\right) =$ ☐

43. Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$\log_b x^4$

$\log_b x^4 =$ ☐

44. Use properties of logarithms to expand each logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_b(z^7y)$

$\log_b(z^7y) =$ ☐

45. Use properties of logarithms to expand each logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_4\left(\frac{\sqrt{y}}{64}\right)$

$\log_4\left(\frac{\sqrt{y}}{64}\right) =$ ☐

46. Use properties of logarithms to expand the logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_2\left(\frac{8}{\sqrt{x+8}}\right)$

$\log_2\left(\frac{8}{\sqrt{x+8}}\right) =$ ☐

47. Use properties of logarithms to expand the logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_b\left(\frac{x^3y}{z^2}\right)$

$\log_b\left(\frac{x^3y}{z^2}\right) =$ ☐

48. Use properties of logarithms to expand the logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$\log_4 \sqrt[9]{\frac{x^8y}{16}}$

$\log_4 \sqrt[9]{\frac{x^8y}{16}} =$ ☐

(Use integers or fractions for any numbers in the expression.)

Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

49. Use properties of logarithms to expand the logarithmic expression as much as possible. Evaluate logarithmic expressions without using a calculator if possible.

$$\ln\left[\frac{x^3\sqrt{x^2+4}}{(x+4)^9}\right]$$

$$\ln\left[\frac{x^3\sqrt{x^2+4}}{(x+4)^9}\right] = \square$$

50. Use properties of logarithms to expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$\log\left[\frac{100x^2\sqrt[3]{9-x}}{3(x+3)^2}\right]$$

$$\log\left[\frac{100x^2\sqrt[3]{9-x}}{3(x+3)^2}\right] = \square$$

51. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

$$\ln x + \ln 4$$

$$\ln x + \ln 4 = \square$$

52. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Evaluate logarithmic expressions if possible.

$$8\log_b x + 3\log_b z$$

$$8\log_b x + 3\log_b z = \square$$

53. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Evaluate logarithmic expressions if possible.

$$2\ln(x+3) - 9\ln x$$

$$2\ln(x+3) - 9\ln x = \square$$

Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

54. Use properties of logarithms to condense the logarithmic expression below. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

$$4 \ln x + 3 \ln y - 5 \ln z$$

$4 \ln x + 3 \ln y - 5 \ln z =$ ☐

55. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

$$\frac{1}{2}(\log_7 a + \log_7 b)$$

$\frac{1}{2}(\log_7 a + \log_7 b) =$ ☐

56. Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions.

$$\log x + \log (x^2 - 64) - \log 2 - \log (x + 8)$$

$\log x + \log (x^2 - 64) - \log 2 - \log (x + 8) =$ ☐
(Simplify your answer.)

57. Use common logarithms or natural logarithms and a calculator to evaluate the expression.

$$\log_{18} 14$$

$\log_{18} 14 \approx$ ☐ (Round to four decimal places.)

58. Use a scientific calculator or a graphing calculator and **common logarithms** to evaluate the following.

$$\log_2 1.5$$

$\log_2 1.5 \approx$ ☐ (Round to two decimal places.)

59. The loudness level of a sound can be expressed by comparing the sound's intensity to the intensity of a sound barely audible to the human ear. The formula

$$D = 10(\log I - \log I_0)$$

describes the loudness level of a sound, D, in decibels, where I is the intensity of the sound, in watts per meter^2, and I_0 is the intensity of a sound barely audible to the human ear. Use this information to answer parts (a) and (b) below.

a. Express the formula so that the expression in parentheses is written as a single logarithm. Choose your answer below.

A. $D = \log\left(\frac{I^{10}}{I_0}\right)$

B. $D = 10\log\left(\frac{I}{I_0}\right)$

C. $D = 10\log(I - I_0)$

D. $D = 10\log(I \cdot I_0)$

b. Use the form of the formula from part (a) to answer this question. If a sound has an intensity 1 / 100th of the intensity of a louder sound, how much smaller on the decibel scale is the loudness level of the less intense sound?

☐ decibels softer

60. Solve the exponential equation by expressing each side as a power of the same base and then equating exponents.

$$2^x = 4$$

The solution set is {☐}.

61. Solve the following exponential equation by expressing each side as a power of the same base and then equating exponents.

$$7^{4x-17} = 343$$

The solution set is {☐}.

62. Solve the following exponential equation by expressing each side as a power of the same base and then equating exponents.

$$4^{x-2} = \frac{1}{64}$$

The solution set is {☐}.

63. Solve the following exponential equation by expressing each side as a power of the same base and then equating exponents.

$$16^{x+5} = 256^{x-1}$$

The solution set is {□}.

64. Solve the following exponential equation by expressing each side as a power of the same base and then equating exponents.

$$e^{x+3} = \frac{1}{e}$$

The solution set is {□}.

65. Solve the following exponential equation. Express the solution set in terms of natural logarithms. Then use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$6^x = 19$$

What is the solution in terms of natural logarithms?

The solution set is {□}.
(Type an exact solution, using logarithmic functions as needed.)

What is the decimal approximation for the solution?

The solution set is {□}.
(Type a decimal rounded to two decimal places.)

66. Solve the following exponential equation by taking the natural logarithm on both sides. Express the solution in terms of natural logarithms. Then, use a calculator to obtain a decimal approximation for the solution.

$$6e^{7x} = 1620$$

What is the solution in terms of natural logarithms?

The solution set is {□}.
(Type an exact solution, using radicals and log functions as needed. Use the change of base formula to write the answer in either base 10 or base *e*.)

What is the decimal approximation for the solution?

The solution set is {□}.
(Round answer to two decimal places.)

67. Solve the exponential equation. Express the solution set in terms of natural logarithms. Then use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$e^{9x-7} - 2 = 15{,}592$$

What is the solution in terms of natural logarithms?

The solution set is {□}.
(Type an exact answer in simplified form. Use integers or fractions for any numbers in the expression.)

What is the decimal approximation for the solution?

The solution set is {□}. (Round to two decimal places as needed.)

68. Solve the exponential equation. Express the solution in terms of natural logarithms. Then use a calculator to obtain a decimal approximation for the solution.

$$3^{(3x-2)} = 7^{(x+1)}$$

What is the solution in terms of natural logarithms?

The solution set is {□}.

What is the decimal approximation for the solution?

The solution set is {□}. (Round to two decimal places.)

69. Solve the exponential equation. Express the solution set in terms of natural logarithms. Then use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$e^{2x} - 16e^{x} + 15 = 0$$

What is the solution in terms of natural logarithms?

The solution set is {□}.
(Use a comma to separate answers as needed. Type an exact answer in simplified form.)

What is the decimal approximation for the solution?

The solution set is {□}.
(Use a comma to separate answers as needed. Round to two decimal places as needed.)

70. Solve the following exponential equation. Express the solution set in terms of natural logarithms. Then use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$$e^{4x} + 2e^{2x} - 15 = 0$$

What is the solution in terms of natural logarithms?

The solution set is {□}.
(Type an exact solution, using logarithm functions as needed.)

What is the decimal approximation for the solution?

The solution set is {□}.
(Type a decimal rounded to two decimal places.)

71. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer.

$$\log_2(x+3) = 2$$

The solution set is {□}. (Type an integer or a simplified fraction.)

72. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression.

$$\log_3(x-4) = -3$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ A. The solution set is {■}.
  (Type an exact answer in simplified form.)
- ○ B. There are infinitely many solutions.
- ○ C. There is no solution.

73. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression.

$8 \ln(8x) = 40$

What is the exact solution? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is {□}.
  (Type an exact answer in simplified form.)
- B. There are infinitely many solutions.
- C. There is no solution.

What is the decimal approximation to the solution? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is {□}.
  (Type an integer or decimal rounded to two decimal places as needed.)
- B. There are infinitely many solutions.
- C. There is no solution.

74. Solve the following logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expression. Give the exact answer. Then, use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

$5 + 4 \ln x = 21$

What is the solution in terms of *e*?

The solution set is {□}.

What is the decimal approximation for the solution?

The solution set is {□}.
(Type a decimal rounded to two decimal places.)

75. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions.

$$\log_{12} x + \log_{12}(11x - 1) = 1$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is {□}.
(Type an exact answer in simplified form.)

B. There are infinitely many solutions.

C. There is no solution.

76. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$\log_4(x - 4) + \log_4(x + 8) = 3$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is {□}.
(Simplify your answer. Use a comma to separate answers as needed.)

B. There is no solution.

77. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$2\log_5(x + 15) = \log_5 25 + 2$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is {□}.
(Simplify your answer. Use a comma to separate answers as needed.)

B. There is no solution.

78. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$\log(x + 8) = \log x + \log 8$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is {□}.
(Simplify your answer. Use a comma to separate answers as needed.)

B. There is no solution.

79. Solve the logarithmic equation. Be sure to reject as a solution any value that is not in the domain of the original logarithmic expressions.

$$2 \log x = \log 25$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is { }.
(Type an exact answer in simplified form. Use a comma to separate answers as needed.)

B. There is no solution.

80. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$\ln (x-5) + \ln (x+2) = \ln (x-14)$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is { }.
(Simplify your answer. Use a comma to separate answers as needed.)

B. There is no solution.

81. Solve the logarithmic equation. Be sure to reject any value of x that is not in the domain of the original logarithmic expressions. Give the exact answer.

$$\ln (x-2) - \ln (x+12) = \ln (x-1) - \ln (x+16)$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The solution set is { }.
(Simplify your answer. Use a comma to separate answers as needed.)

B. There is no solution.

82. Solve the equation.

$$3^{7x} \cdot 3^{3x} = 243$$

The solution set is { }.
(Simplify your answer. Use a comma to separate answers as needed.)

83. Solve the equation.

$$6|\ln x| - 30 = 0$$

The solution set is { }.
(Type an exact answer in terms of e. Use a comma to separate answers as needed.)

84. Solve the equation using the natural logarithm.

$$2^{x^2} = 12$$

Find the solution set. Choose the correct answer below.

A. $\left\{\sqrt{\ln \frac{12}{2}}\right\}$

B. $\left\{-\sqrt{\frac{\ln 12}{\ln 2}}, \sqrt{\frac{\ln 12}{\ln 2}}\right\}$

C. $\left\{\sqrt{\frac{\ln 12}{\ln 2}}\right\}$

D. $\left\{-\sqrt{\ln \frac{12}{2}}, \sqrt{\ln \frac{12}{2}}\right\}$

85. Solve the equation.

$$2^{x^2-48} = 4^x$$

The solution set is $\{\square\}$.
(Use a comma to separate answers as needed.)

86. The exponential model $A = 848.4\,e^{0.026t}$ describes the population, A, of a country in millions, t years after 2003. Use the model to determine the population of the country in 2003.

The population of the country in 2003 was $\square$ million.

87. The exponential models describe the population of the indicated country, A, in millions, t years after 2006. Which country has the greatest growth rate? By what percentage is the population of that country increasing each year?

Country 1: $A = 1090.4\,e^{0.019t}$
Country 2: $A = 26.6\,e^{0.031t}$
Country 3: $A = 148.6\,e^{-0.007t}$
Country 4: $A = 125.2\,e^{0.002t}$

Country $\square$ has the greatest growth rate.

The population of that country is increasing by $\square$% each year.

88. The exponential model $A = 36.1\,e^{0.03t}$ describes the population, A, of a country in millions, t years after 2003. Use the model to determine when the population of the country will be 72 million.

The population of the country will be 72 million in $\square$.
(Round to the nearest year as needed.)

89. The half-life of a certain tranquilizer in the bloodstream is 42 hours. How long will it take for the drug to decay to 84% of the original dosage? Use the exponential decay model, $A = A_0\,e^{kt}$, to solve.

$\square$ hours
(Round to one decimal place as needed.)

90. Use the exponential growth model, $A = A_0 e^{kt}$, to find the time it takes a population to double (to grow from A_0 to $2A_0$).

t = ☐ (Simplify your answer.)

91. Determine whether the given ordered pair is a solution of the system.

$(2, -3)$

$y = 7x - 17$

$2x + 6y = -14$

Is $(2, -3)$ a solution of the system?

- ○ Yes
- ○ No

92. Determine whether the given ordered pair is a solution of the system.

$(4, -4)$

$2x + 4y = -8$

$4x - 3y = 29$

- ○ solution
- ○ not a solution

93. Solve the system by the substitution method.

$x + y = 15$

$y = 4x$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ A. The solution set is {☐}. (Type an ordered pair.)
- ○ B. There are infinitely many solutions.
- ○ C. There is no solution.

94. Solve the system by the substitution method.

$$\begin{aligned} x - 3y &= -1 \\ y &= -2x + 19 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{\square\}$. (Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

95. Solve the system by the addition method.

$$\begin{aligned} x + y &= -6 \\ x - y &= 2 \end{aligned}$$

Select the correct choice below and fill in any answer boxes present in your choice.

- A. The solution set is $\{\square\}$. (Simplify your answer. Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

96. Solve the system by the addition method.

$$\begin{aligned} 2x + 6y &= 4 \\ 3x - 6y &= 6 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{\square\}$. (Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

97. Solve the system by the addition method.

$$\begin{aligned} x + 2y &= -6 \\ 4x + 3y &= -4 \end{aligned}$$

Select the correct choice below and fill in any answer boxes present in your choice.

- A. The solution set is $\{\square\}$. (Simplify your answer. Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

98. Solve the system by the addition method.

$$\begin{aligned} 4x &= 3y + 2 \\ 8x &= -5 - 7y \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{\square\}$.
  (Type an ordered pair. Use integers or fractions for any numbers in the expression.)
- B. There are infinitely many solutions.
- C. There is no solution.

99. Solve by the method of your choice.

$$\begin{aligned} 2x + 4y &= 8 \\ 3x + 6y &= 12 \end{aligned}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{\square\}$. (Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

100. Solve the system by the method of your choice.

$$3x = y - 5$$
$$3x - y = 8$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{\square\}$. (Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

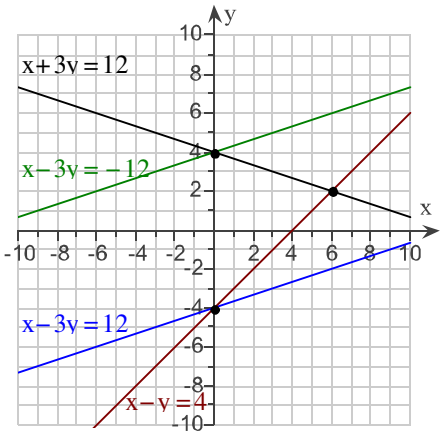
101. Solve the system by the method of your choice.

$$\frac{x+5}{5} - \frac{y+10}{6} = 6$$
$$\frac{x+y}{11} = \frac{x-y}{5} - \frac{11}{5}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. The solution set is $\{\square\}$. (Type an ordered pair.)
- B. There are infinitely many solutions.
- C. There is no solution.

102. Use the graphs of the linear functions on the right. Write the linear system whose solution set is $\{(0,4)\}$. Express each equation in the system in slope-intercept form.



Choose the correct answer below.

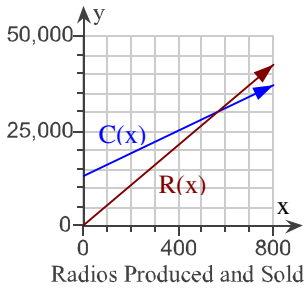
- A. $y = \frac{1}{3}x - 4$; $y = x - 4$
- B. $y = -\frac{1}{3}x + 4$; $y = x - 4$
- C. $y = -\frac{1}{3}x + 4$; $y = \frac{1}{3}x + 4$
- D. $y = \frac{1}{3}x + 4$; $y = x - 4$

103. Use the functions given below to solve the problem. C(x) represents the cost, in dollars, of x units of a product and R(x) represents the revenue, in dollars, from the sale of x units. Find the number of units that must be produced and sold in order to break even.

$C(x) = 48{,}000 + 36x$ and $R(x) = 40x$

The number of units that must be produced and sold in order to break even is ☐ units.

104. The figure shows the graphs of the cost and revenue functions of a company that manufactures and sells small radios. Use the formulas below to find $R(500) - C(500)$. Describe what it means for the company.



$R(x) = 53x$
$C(x) = 13{,}000 + 30x$

What is the value of $R(500) - C(500)$?

$R(500) - C(500) = \$$☐

Which of the following statements best describes what this means for the company?

- ○ A. The company is losing money because revenue is greater than cost.
- ○ B. The company is making money because cost is greater than revenue.
- ○ C. The company is making money because revenue is greater than cost.
- ○ D. The company is losing money because cost is greater than revenue.
- ○ E. The company is breaking even because cost and revenue are equal.

105. Solve the given system of equations.

$$\begin{aligned} x + y + 7z &= -11 \\ x + y + 4z &= -8 \\ x - 8y + 9z &= 5 \end{aligned}$$

Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. There is one solution. The solution set is $\{($☐,☐,☐$)\}$. (Simplify your answers.)
- ○ B. There are infinitely many solutions.
- ○ C. There is no solution.

106. Solve the system. If there is no solution or if there are infinitely many solutions and the system's equations are dependent, so state.

$$\begin{aligned} 6x - y + 3z &= 14 \\ x + 3y - z &= 7 \\ 3x + 3y - 4z &= 16 \end{aligned}$$

Select the correct choice below and fill in any answer boxes within your choice.

- A. There is one solution. The solution set is {(□, □, □)}. (Simplify your answers.)
- B. There are infinitely many solutions.
- C. There is no solution.

107. Solve the given system of equations.

$$\begin{aligned} 5x + 4y - 5z &= 14 \\ 2x - 3y + 2z &= -15 \\ 4x - 2y + 4z &= -26 \end{aligned}$$

Select the correct choice below and fill in any answer boxes within your choice.

- A. There is one solution. The solution set is {(□, □, □)}. (Simplify your answers.)
- B. There are infinitely many solutions.
- C. There is no solution.

108. Solve the system. If there is no solution or if there are infinitely many solutions and the system's equations are dependent, so state.

$$\begin{aligned} 4x - 8y + 3z &= -6 \\ x + 4y - z &= 0 \\ 8x - y - z &= -24 \end{aligned}$$

Select the correct choice below and fill in any answer boxes within your choice.

- A. There is one solution. The solution set is {(□, □, □)}. (Simplify your answers.)
- B. There are infinitely many solutions.
- C. There is no solution.

Student: James Cook	**Instructor:** James Cook	**Assignment:** Assignment 4 (covered by Test 3)
Date: 8/19/11	**Course:** Math 121, section 3, Fall 2011	
Time: 2:51 PM	**Book:** Blitzer: College Algebra, 5e	

109. Solve the system. If there is no solution or if there are infinitely many solutions and the system's equations are dependent, so state.

$$\begin{aligned} 4x + y &= -12 \\ x + y - z &= -18 \\ 5x + 2y + z &= 0 \end{aligned}$$

Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. There is one solution. The solution set is $\{(\square,\square,\square)\}$. (Simplify your answers.)
- ○ B. There are infinitely many solutions.
- ○ C. There is no solution.

110. Solve the system.

$$\begin{aligned} -3x - y &= 3 \\ y - 4z &= 7 \\ x - 2y + z &= -9 \end{aligned}$$

Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. There is one solution. The solution set is $\{(\square,\square,\square)\}$. (Simplify your answers.)
- ○ B. There are infinitely many solutions.
- ○ C. There is no solution.

111. Find the quadratic function $y = ax^2 + bx + c$ whose graph passes through the given points.

$(1,0), (3,-8), (2,-5)$

$y =$ □

112. Find the quadratic function $y = ax^2 + bx + c$ whose graph passes through the given points.

$(-1,-7), (1,-5), (-3,15)$

$y =$ □

113. The sum of three numbers is 18. The sum of twice the first number, 4 times the second number, and 5 times the third number is 69. The difference between 3 times the first number and the second number is 9. Find the three numbers.

first number: ☐

second number: ☐

third number: ☐

114. Solve the system.

$$\frac{x+2}{6}-\frac{y+2}{3}+\frac{z}{2}=0$$
$$\frac{x+1}{2}+\frac{y-1}{2}-\frac{z}{4}=3$$
$$\frac{x-5}{4}+\frac{y+1}{3}+\frac{z-2}{2}=\frac{31}{12}$$

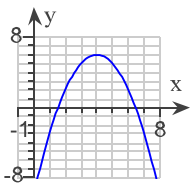
Select the correct choice below and fill in any answer boxes within your choice.

○A. There is one solution. The solution set is $\{(\square,\square,\square)\}$. (Simplify your answers.)

○B. There are infinitely many solutions.

○C. There is no solution.

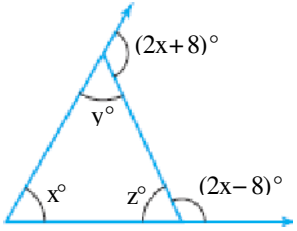
115. Find the equation of the quadratic function $y = ax^2 + bx + c$ whose graph is shown on the right. Select three points whose coordinates appear to be integers.



y = ☐

(Simplify your answer. Type an expression using x as the variable.)

116. Find the values of x, y, and z in the triangle to the right.



x = ☐

y = ☐

z = ☐

117. Find the domain of the following rational function.

$$R(x) = \frac{16x}{x + 20}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain of R(x) is $\{x|x \neq \square\}$.(Use a comma to separate answers as necessary.)

B. There are no restrictions on the domain of R(x).

118. Find the domain of the following rational function.

$$H(x) = \frac{-8x^2}{(x-1)(x+8)}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain of H(x) is $\{x|x \neq \square\}$. (Use a comma to separate answers as needed.)

B. The domain of H(x) has no restrictions.

119. Find the domain of the following rational function.

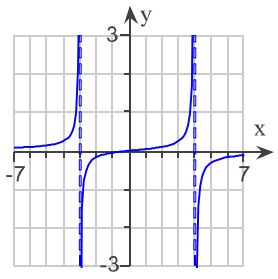
$$H(x) = \frac{16x^2 + x}{x^2 + 9}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The domain of $H(x) = \frac{16x^2 + x}{x^2 + 9}$ is $\{x|x \neq \square\}$.
(Use a comma to separate answers as needed.)

B. There are no restrictions on the domain of H(x).

120. Use the graph of the rational function to complete the following statement.



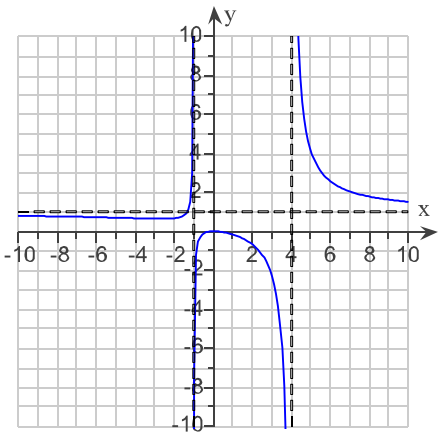
As $x \to 4^-$, $f(x) \to$ ____.

As $x \to 4^-$, $f(x) \to \square$.

121. Use the graph of the rational function to complete the following statement.

As $x \to 4^-$, $f(x) \to$ ____.

As $x \to 4^-$, $f(x) \to$ ☐.



Asymptotes are shown as dashed lines. The horizontal asymptote is $y = 1$. The vertical asymptotes are $x = -1$ and $x = 4$.

122. Find the vertical asymptotes, if any, of the graph of the rational function.

$$f(x) = \frac{x}{x - 6}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○A. The vertical asymptote(s) is(are) ■.
(Type an equation. Use commas to separate answers as needed.)

○B. There are no vertical asymptotes.

123. Find the vertical asymptotes, if any, of the graph of the rational function.

$$h(x) = \frac{x + 3}{x(x + 6)}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○A. The vertical asymptote(s) is(are) ■.
(Type an equation. Use a comma to separate answers as needed.)

○B. There are no vertical asymptotes.

124. Find the vertical asymptotes, if any, of the graph of the rational function.

$$h(x) = \frac{x}{x(x-3)}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The vertical asymptote(s) is(are) ☐.
(Type an equation. Use commas to separate answers as needed.)

B. There are no vertical asymptotes.

125. Find the horizontal asymptote, if any, of the graph of the rational function.

$$f(x) = \frac{14x}{5x^2+2}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The horizontal asymptote is ☐. (Type an equation.)

B. There is no horizontal asymptote.

126. Find the horizontal asymptote, if any, of the graph of the rational function.

$$g(x) = \frac{15x^2}{5x^2+1}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The horizontal asymptote is ☐. (Type an equation.)

B. There is no horizontal asymptote.

127. Find the horizontal asymptote, if any, of the graph of the rational function.

$$h(x) = \frac{11x^3}{8x^2+3}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

A. The horizontal asymptote is ☐. (Type an equation.)

B. There is no horizontal asymptote.

128. Find the horizontal asymptote, if any, of the graph of the rational function.

$$f(x) = \frac{-5x + 6}{3x + 2}$$

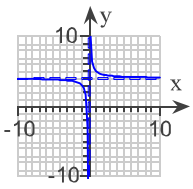
Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

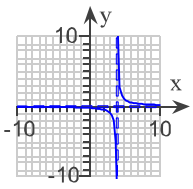
A. The equation of the horizontal asymptote is ☐.
(Simplify your answer. Use integers or fractions for any numbers in the equation.)

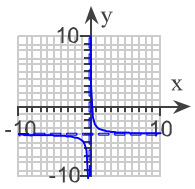
B. There is no horizontal asymptote.

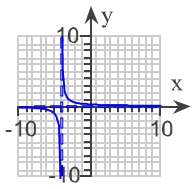
129. Use transformations of $f(x) = \frac{1}{x}$ to graph $g(x) = \frac{1}{x - 4}$.

Select the correct graph.

A. 

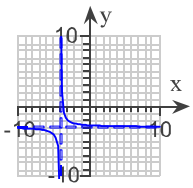
B. 

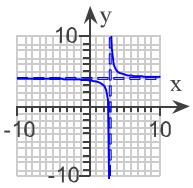
C. 

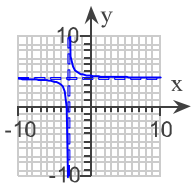
D. 

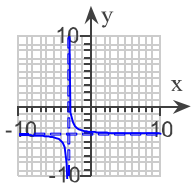
130. Use transformations of $f(x) = \frac{1}{x}$ to graph $g(x) = \frac{1}{x - 3} + 4$.

Select the correct graph.

A. 

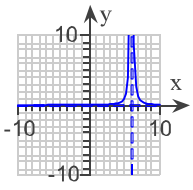
B. 

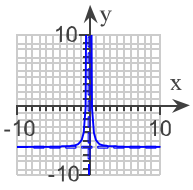
C. 

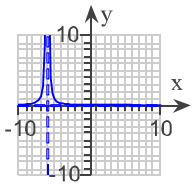
D. 

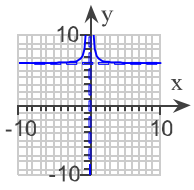
131. Use transformations of $f(x) = \frac{1}{x^2}$ to graph $g(x) = \frac{1}{x^2} - 6$.

Select the correct graph.

A. 

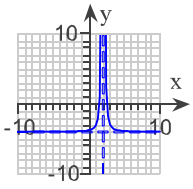
B. 

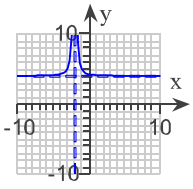
C. 

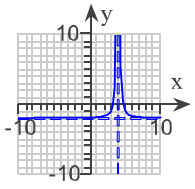
D. 

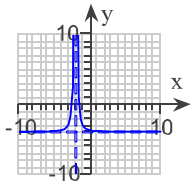
132. Use transformations of $f(x) = \frac{1}{x^2}$ to graph $g(x) = \frac{1}{(x-2)^2} - 4$.

Select the correct graph.

A. 

B. 

C. 

D. 

133. Use the seven step method described in the book to graph the following rational function.

$$f(x) = \frac{6x}{x^2 - 16}$$

1. Determine the symmetry of the function. Choose the correct answer below.

- ○ The graph of f is symmetric with respect to the origin.
- ○ The graph of f is symmetric with respect to the y-axis.
- ○ The graph of f has neither y-axis symmetry nor origin symmetry.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The y-intercept is ▢.
  (Type an integer or a simplified fraction.)
- ○B. There is no y-intercept.

3. Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The x-intercept(s) is ▢.
  (Use a comma to separate answers as needed.)
- ○B. There is no x-intercept.

4. What is the equation of the vertical asymptote(s) of f(x)? Select the correct choice below and fill in any answer boxes within your choice.

- ○A. x = ▢
  (Use a comma to separate answers as needed. Type an integer or a fraction.)
- ○B. There is no vertical asymptote.

5. What is the equation of the horizontal asymptote(s) of f(x)? Select the correct choice below and fill in any answer boxes within your choice.

- ○A. y = ▢
  (Use a comma to separate answers as needed. Type an integer or a fraction.)
- ○B. There is no horizontal asymptote.

6. Plot points between and beyond the x-intercept and the vertical asymptotes. Type the y-coordinate for each of the following points.

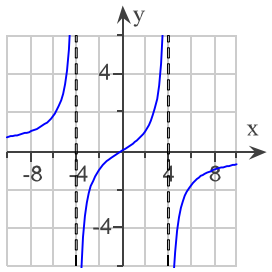
x	-5	-1	$\frac{1}{2}$	1	5
$f(x) = \frac{6x}{x^2 - 16}$	☐	☐	☐	☐	☐

(Simplify your answers.)

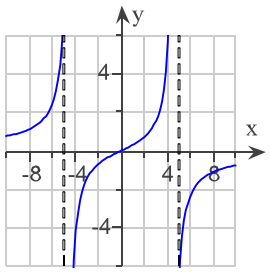
133. (cont.)

7. Using the information determined above, choose the graph of the rational function.

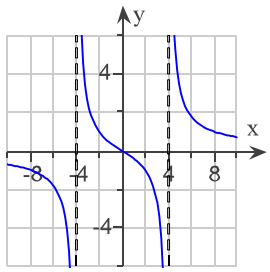
○ A.



○ B.



○ C.



134. Use the seven step method described in the book to graph the following rational function.

$$f(x) = \frac{5x^2}{x^2 - 1}$$

1. Determine the symmetry of the function. Choose the correct answer below.

- ○ The graph of f is symmetric with respect to the y-axis.
- ○ The graph of f is symmetric with respect to the origin.
- ○ The graph of f has neither y-axis symmetry nor origin symmetry.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The y-intercept is ☐.
- ○B. There is no y-intercept.

3. Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The x-intercept(s) is ☐. (Use a comma to separate answers as needed.)
- ○B. There is no x-intercept.

4. Find the vertical asymptote(s). Type the equation(s) of the vertical asymptote(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. x = ☐ (Use a comma to separate answers as needed.)
- ○B. There is no vertical asymptote.

5. Find the horizontal asymptote(s). Type the equation(s) of the horizontal asymptote(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. y = ☐ (Use a comma to separate answers as needed.)
- ○B. There is no horizontal asymptote.

6. Plot points between and beyond the x-intercept and the vertical asymptotes. Type the y-coordinate for each of the following points.

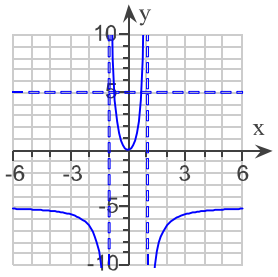
x	-4	-3	$-\frac{1}{2}$	3	4
$f(x) = \frac{5x^2}{x^2 - 1}$	☐	☐	☐	☐	☐

(Type an integer or a simplified fraction.)

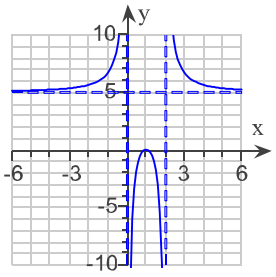
7. Using the information determined above, choose the graph of the rational function.

134. (cont.)

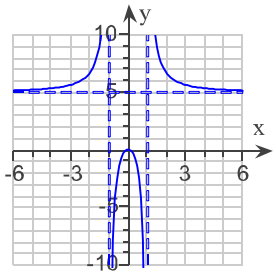
○ A.



○ B.



○ C.



135. Graph the rational function. Answer parts **1.** through **7.** below.

$$f(x) = \frac{-x}{x+3}$$

1. Select the symmetry of the function.

- ○ The function is symmetric about the y-axis.
- ○ The function is symmetric about the origin.
- ○ The function has no symmetry about the y-axis or the origin.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. The y-intercept is ▢.
- ○ B. There is no y-intercept.

3. Find any x-intercepts. Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. The x-intercept(s) is/are ▢.
  (Use a comma to separate answers as needed.)
- ○ B. There are no x-intercepts.

4. What are the x-coordinates of the vertical asymptote(s)? Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. x = ▢
  (Use a comma to separate answers as needed.)
- ○ B. There are no vertical asymptotes.

5. What is the y-coordinate of the horizontal asymptote? Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. y = ▢
- ○ B. There is no horizontal asymptote.

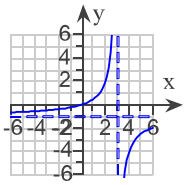
6. Type the y-coordinate for each of the following points:

$(-5,\square)$, $(-1,\square)$, $(3,\square)$
(Type integers or simplified fractions.)

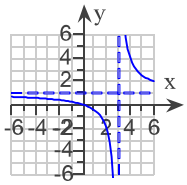
7. Using the information determined above, select the graph of the rational function.

135. (cont.)

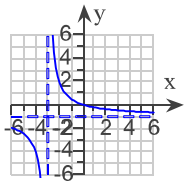
A.



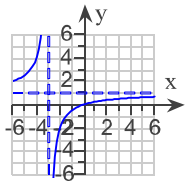
B.



C.



D.



136. Use the seven step method described in the book to graph the following rational function.

$$f(x) = -\frac{7}{x^2 - 4}$$

1. Determine the symmetry of the function. Choose the correct answer below.

- ○ The graph of f is symmetric with respect to the y-axis.
- ○ The graph of f is symmetric with respect to the origin.
- ○ The graph of f has neither y-axis symmetry nor origin symmetry.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The y-intercept is ☐. (Type an integer or a simplified fraction.)
- ○B. There is no y-intercept.

3. Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The x-intercept(s) is ☐. (Use a comma to separate answers as needed.)
- ○B. There is no x-intercept.

4. What is the equation of the vertical asymptote(s) of f(x)? Select the correct choice below and fill in any answer boxes within your choice.

- ○A. x = ☐ (Use a comma to separate answers as needed. Type an integer or a fraction.)
- ○B. There is no vertical asymptote.

5. What is the equation of the horizontal asymptote(s) of f(x)? Select the correct choice below and fill in any answer boxes within your choice.

- ○A. y = ☐ (Use a comma to separate answers as needed. Type an integer or a fraction.)
- ○B. There is no horizontal asymptote.

6. Plot points between and beyond the x-intercept and the vertical asymptotes. Type the y-coordinate for each of the following points.

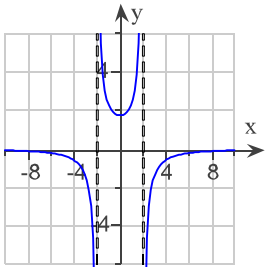
x	-3	-1	$\frac{1}{2}$	1	3
$f(x) = -\frac{7}{x^2 - 4}$	☐	☐	☐	☐	☐

(Type an integer or a simplified fraction.)

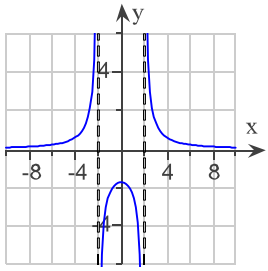
136. (cont.)

7. Using the information determined above, choose the graph of the rational function.

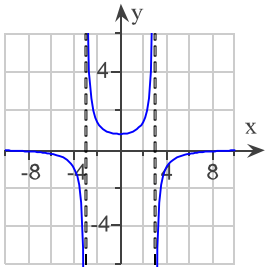
○ A.



○ B.



○ C.



137. Graph the rational function. Answer parts **1.** through **7.** below.

$$f(x) = \frac{6}{x^2 + 5x + 4}$$

1. Select the symmetry of the function.

- ○ The function is symmetric about the y-axis.
- ○ The function is symmetric about the origin.
- ○ The function has no symmetry about the y-axis or the origin.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The y-intercept is ☐.
  (Type an integer or simplified fraction.)
- ○B. There is no y-intercept.

3. Find any x-intercepts. Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The x-intercept(s) is/are ☐.
  (Use a comma to separate answers as needed.)
- ○B. There are no x-intercepts.

4. What are the x-coordinates of the vertical asymptote(s)? Select the correct choice below and fill in any answer boxes within your choice.

- ○A. x = ☐
  (Use a comma to separate answers as needed.)
- ○B. There are no vertical asymptotes.

5. What is the y-coordinate of the horizontal asymptote? Select the correct choice below and fill in any answer boxes within your choice.

- ○A. y = ☐
- ○B. There is no horizontal asymptote.

6. Type the y-coordinate for each of the following points:

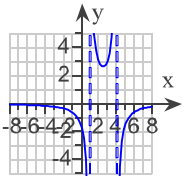
$(-5, \square)$
$(-2, \square)$
$(3, \square)$

137. (cont.)

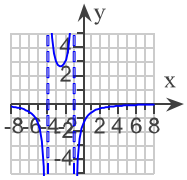
(Type integers or simplified fractions.)

7. Using the information determined above, select the graph of the rational function.

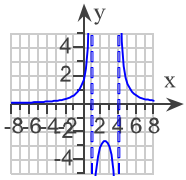
○ A.



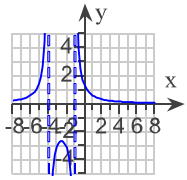
○ B.



○ C.



○ D.



138. Graph the rational function. Answer parts **1.** through **7.** below.

$$f(x) = \frac{2x^2}{x^2 + 3}$$

1. Select the symmetry of the function.

- ○ The function is symmetric about the y-axis.
- ○ The function is symmetric about the origin.
- ○ The function has no symmetry about the y-axis or the origin.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. The y-intercept is ☐.
- ○ B. There is no y-intercept.

3. Find any x-intercepts. Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. The x-intercept(s) is/are ☐.
  (Use a comma to separate answers as needed.)
- ○ B. There are no x-intercepts.

4. What are the x-coordinates of the vertical asymptote(s)? Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. x = ☐
  (Use a comma to separate answers as needed.)
- ○ B. There are no vertical asymptotes.

5. What is the y-coordinate of the horizontal asymptote? Select the correct choice below and fill in any answer boxes within your choice.

- ○ A. y = ☐
- ○ B. There is no horizontal asymptote.

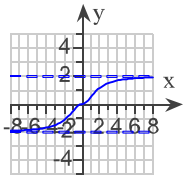
6. Type the y-coordinate for each of the following points:

$(-2, \square)$
$(2, \square)$
(Type integers or simplified fractions.)

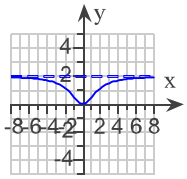
138. (cont.)

7. Using the information determined above, select the graph of the rational function.

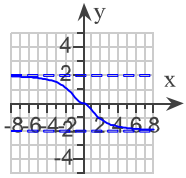
○ A.



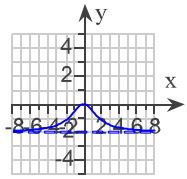
○ B.



○ C.



○ D.



139. Use the seven step method described in the book to graph the following rational function.

$$f(x) = \frac{x+2}{x^2+2x-8}$$

1. Determine the symmetry of the function. Choose the correct answer below.

- ○ The graph of f is symmetric with respect to the y-axis.
- ○ The graph of f has neither y-axis symmetry nor origin symmetry.
- ○ The graph of f is symmetric with respect to the origin.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The y-intercept is ▢.
- ○B. There is no y-intercept.

3. Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. The x-intercept(s) is ▢. (Use a comma to separate answers as needed.)
- ○B. There is no x-intercept.

4. Find the vertical asymptote(s). Type the equation(s) of the vertical asymptote(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. x = ▢ (Use a comma to separate answers as needed.)
- ○B. There is no vertical asymptote.

5. Find the horizontal asymptote(s). Type the equation(s) of the horizontal asymptote(s). Select the correct choice below and fill in any answer boxes within your choice.

- ○A. y = ▢ (Use a comma to separate answers as needed.)
- ○B. There is no horizontal asymptote.

6. Plot points between and beyond the x-intercept and the vertical asymptotes. Type the y-coordinate for each of the following points.

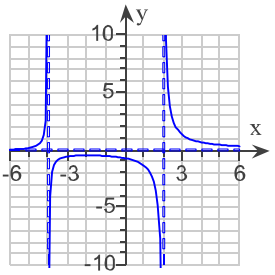
x	−5	−3	0	3	5
$f(x) = \frac{x+2}{x^2+2x-8}$	☐	☐	☐	☐	☐

(Simplify your answers.)

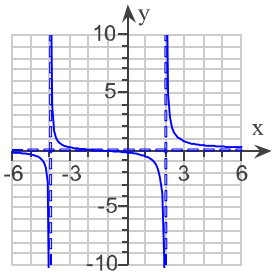
7. Using the information determined above, choose the graph of the rational function.

139. (cont.)

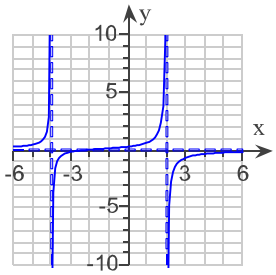
A.



B.



C.



140. **a.** Find the slant asymptote of the graph of the rational function and **b.** Use the slant asymptote to graph the rational function.

$$f(x) = \frac{x^2 - 49}{x}$$

a. Find the slant asymptote of the graph of f. Select the correct choice below and fill in any answer boxes within your choice.

- A. $y =$ ☐
- B. There is no slant asymptote.

b. Use the slant asymptote to graph the rational function.

First determine the symmetry of the graph of f.

- A. The graph has y-axis symmetry: $f(-x) = f(x)$.
- B. The graph has origin symmetry: $f(-x) = -f(x)$.
- C. The graph has both y-axis and origin symmetry.
- D. The graph has neither y-axis nor origin symmetry.

Find the y-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- A. The y-intercept is ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. There is no y-intercept.

Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- A. The x-intercept is ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. There is no x-intercept.

Find the vertical asymptote(s). Select the correct choice below and fill in any answer boxes within your choice.

- A. $x =$ ☐
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. There is no vertical asymptote.

Find the horizontal asymptote(s). Select the correct choice below and fill in any answer boxes within your

140. (cont.)

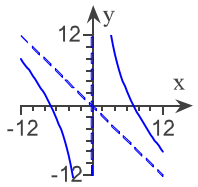
choice.

A. $y =$ ☐
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

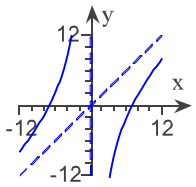
B. There is no horizontal asymptote.

Plot points between and beyond each x-intercept and vertical asymptote, then use the information above to graph the rational function. Choose the correct graph below.

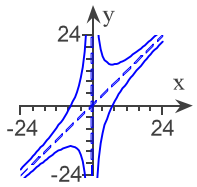
A.



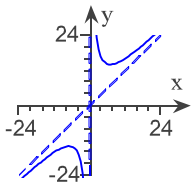
B.



C.



D.



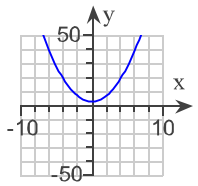
141. **a.** Find the slant asymptote of the graph of the rational function.
b. Follow the seven-step strategy and use the slant asymptote to graph the rational function.

$$f(x) = \frac{x^2 + 3}{x - 1}$$

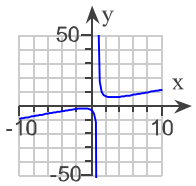
a. The slant asymptote of the graph of the function is $y =$ ☐.

b. Which of the following is the graph of $y = f(x)$?

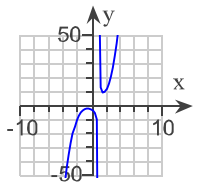
A.



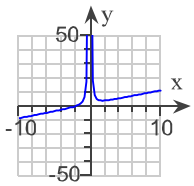
B.



C.



D.



142. **a.** Find the slant asymptote of the graph of the rational function and **b.** Use the slant asymptote to graph the rational function.

$$f(x) = \frac{x^2 - x - 12}{x - 7}$$

a. Find the slant asymptote of the graph of f. Select the correct choice below and fill in any answer boxes within your choice.

- A. $y =$ ☐
- B. There is no slant asymptote.

b. Use the slant asymptote to graph the rational function.

First determine the symmetry of the graph of f.

- A. The graph has y-axis symmetry: $f(-x) = f(x)$.
- B. The graph has origin symmetry: $f(-x) = -f(x)$.
- C. The graph has both y-axis and origin symmetry.
- D. The graph has neither y-axis nor origin symmetry.

Find the y-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- A. The y-intercept is ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. There is no y-intercept.

Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

- A. The x-intercept is ☐.
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. There is no x-intercept.

Find the vertical asymptote(s). Select the correct choice below and fill in any answer boxes within your choice.

- A. $x =$ ☐
  (Type an integer or a simplified fraction. Use a comma to separate answers as needed.)
- B. There is no vertical asymptote.

Find the horizontal asymptote(s). Select the correct choice below and fill in any answer boxes within your

142. (cont.)

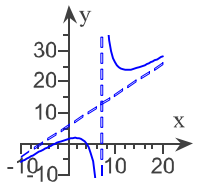
choice.

A. y = ☐
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

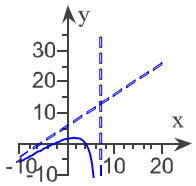
B. There is no horizontal asymptote.

Plot points between and beyond each x-intercept and vertical asymptote, then use the information above to graph the rational function. Choose the correct graph below.

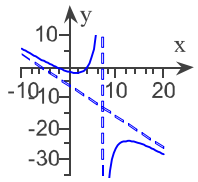
A.



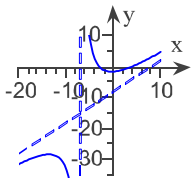
B.



C.



D.



143. **a.** Find the slant asymptote of the graph of the rational function and **b.** Use the slant asymptote to graph the rational function.

$$f(x) = \frac{x^3 + 64}{x^2 + x}$$

a. Find the slant asymptote of the graph of f. Select the correct choice below and fill in any answer boxes within your choice.

A. $y =$ ☐

B. There is no slant asymptote.

b. Use the slant asymptote to graph the rational function.

First determine the symmetry of the graph of f.

A. The graph has y-axis symmetry: $f(-x) = f(x)$.

B. The graph has origin symmetry: $f(-x) = -f(x)$.

C. The graph has both y-axis and origin symmetry.

D. The graph has neither y-axis nor origin symmetry.

Find the y-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

A. The y-intercept is ☐.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There is no y-intercept.

Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

A. The x-intercept is ☐.
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There is no x-intercept.

Find the vertical asymptote(s). Select the correct choice below and fill in any answer boxes within your choice.

A. $x =$ ☐
(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

B. There is no vertical asymptote.

Find the horizontal asymptote(s). Select the correct choice below and fill in any answer boxes within your

143. (cont.)

choice.

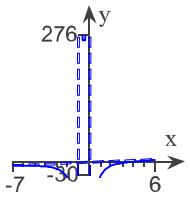
A. $y =$ ☐

(Type an integer or a simplified fraction. Use a comma to separate answers as needed.)

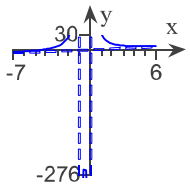
B. There is no horizontal asymptote.

Plot points between and beyond each x-intercept and vertical asymptote, then use the information above to graph the rational function. Choose the correct graph below.

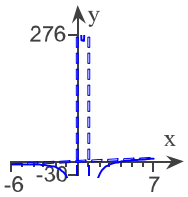
A.



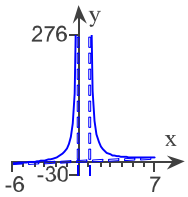
B.



C.



D.



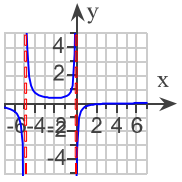
144. The equation for f is given by the simplified expression that results after performing the indicated operation. Write the equation for f and then graph the function

$$\frac{2x^8}{x^2-25}\cdot\frac{x^2+10x+25}{6x^9}$$

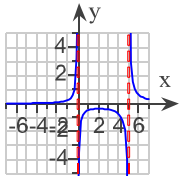
f(x) = ☐

Choose the correct graph below.

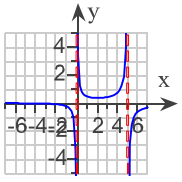
A.



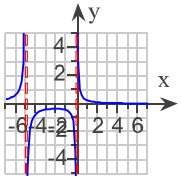
B.



C.



D.



145. The equation for f is given by the simplified expression that results after performing the indicated operation. Write the equation for f and then graph the function.

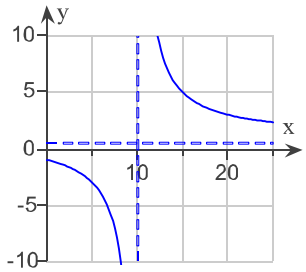
$$\frac{x}{2x+20} - \frac{100}{x^2-100}$$

a. Find the equation for f.

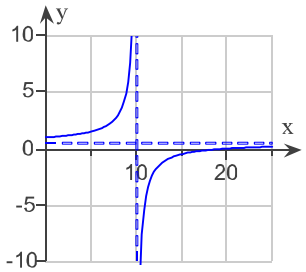
f(x) = ☐

b. Graph the function f(x). Choose the correct graph below.

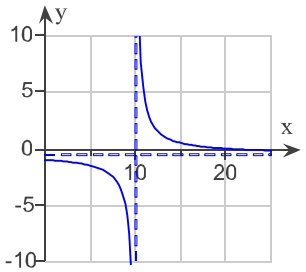
○A.



○B.



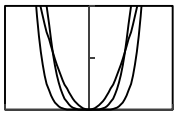
○C.



146. Use a graphing utility to graph $y = \frac{3}{2x^2}$, $y = \frac{3}{2x^4}$, and $y = \frac{3}{2x^6}$ in the same viewing rectangle. For even values of n, how does changing n affect the graph of $y = \frac{3}{2x^n}$?

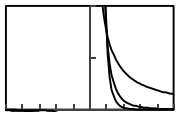
Choose the correct graph below.

○A.



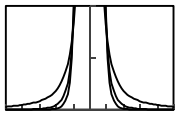
[− 1,1,1] by [0,2,1]

○B.



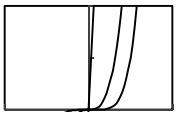
[− 5,5,1] by [0,2,1]

○C.



[− 5,5,1] by [0,2,1]

○D.



[− 1,1,1] by [0,2,1]

For even values of n, how does changing n affect the graph of $y = \frac{3}{2x^n}$?

○A. Lower values of n cause the function to increase more rapidly as $x \to \infty$.

○B. Higher values of n cause the function to rise more sharply as $x \to 0$.

○C. Higher values of n cause the function to increase more rapidly as $x \to \infty$.

○D. Lower values of n cause the function to rise more sharply as $x \to 0$.