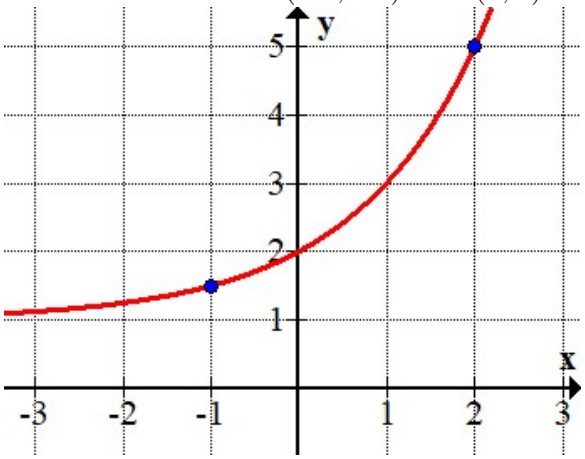
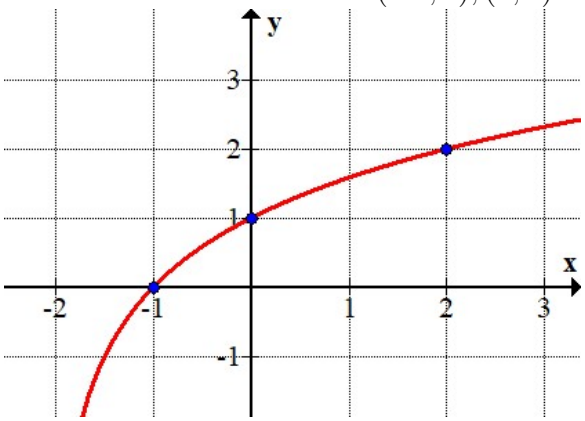
*25pts to earn here. Thanks! There will be a Blackboard submission assignment for this. I'll make an annoucement once I have it set-up. This will be due by 12-3-2020 at 10pm, Central Time.*

**Problem 72:** (1pts) Suppose $f(x) = \log(x^2 - 7x + 6)$. Find the domain of $f(x)$.

**Problem 73:** (1pts) Find values for $a, c$ such that $y = c + a^x$ describes the graph given below: notice the blue dots are at $(-1, 1.5)$ and $(2, 5)$ respectively.




**Problem 74:** (1pts) Find values for $b, c$ such that $y = \log_b(x - c)$ describes the graph given below: notice the blue dots are at $(-1, 0), (0, 1)$ and $(2, 2)$ respectively.




**Problem 75:** (1pts) Simplify $\log(\log(10^{1000}))$

**Problem 76:** (3pts) Use the laws of logarithms to expand the following expressions:

**(a.)** $\log_3(9(x^2 + 3x + 2))$

**(b.)** $\ln\left(\dfrac{5x^3}{(1+x^2)^7}\right)$

**(c.)** $\log(10^x 100^y 1000^z)$

**Problem 77:** (3pts) Use the laws of logarithms to combine the following expressions:

**(a.)** $\log_7(x^2-4) - \log_7(x+2) - \log_7(x-2)$

**(b.)** $2\log(x+1) - \log(x+2)$

**(c.)** $\dfrac{\ln(x+4)}{\ln 10} + \log(x)$

**Problem 78:** (5pts) Solve the following equations.

**(a.)** $2^x - 3 = 5$

**(b.)** $e^{x^2} = e^9$

**(c.)** $e^{3-5x} = 16$

**(d.)** $\dfrac{7}{2+e^{-x}} = 2$

**(e.)** $4^x + 2^{3+2x} = 36$

**(f.)** $e^{2x} - 3e^x + 2 = 0$

**(g.)** $\log_5(x) + \log_5(x+1) = \log_5(20)$

**(h.)** $\ln(x - \frac{1}{2}) + \ln(2) = 2\ln(x)$

**(i.)** $\ln x = 10$

**(j.)** $\log(x) + \log(x-3) = 1$

**Problem 79:** (1pt) Solve $\log_x(3) = \frac{1}{3}$.

**Problem 80:** (1pt) If $f(x) = 10^{3x-7}$ then find $f^{-1}(y)$.

**Problem 81:** (1pt) If $f(x) = \dfrac{1}{2+e^{-x}}$ then find $f^{-1}(y)$.

**Problem 82:** (1pt) If $f(x) = \ln(\sqrt{x+1}\,)$ then find $f^{-1}(y)$.

**Problem 83:** (1pt) Let $\cosh(x) = \frac{1}{2}(e^x + e^{-x})$ and $\sinh(x) = \frac{1}{2}(e^x - e^{-x})$. Show[1] that:

**(a.)** $\cosh x + \sinh x = e^x$

**(b.)** $\cosh(-x) = \cosh(x)$ and $\sinh(-x) = -\sinh(x)$

**(c.)** $\cosh^2 x - \sinh^2 x = 1$

**Problem 84:** (2pt) If $f(x) = \sinh x$ then find $f^{-1}(y)$ and express the formula in terms of a natural logarithm of an appropriate algebraic function. Graph both $y = f(x)$ and $y = f^{-1}(x)$.

**Problem 85:** (3pt) Let $f(x) = \tanh(x)$ where $\tanh(x) = \frac{\sinh x}{\cosh x}$. Find the domain and range of this function then calculate the formula for $f^{-1}(y)$. Graph both $y = f(x)$ and $y = f^{-1}(x)$.

[1] here $\cosh^2(x) = (\cosh x)^2$ and $\sinh^2(x) = (\sinh x)^2$