Math 113-08: Fall 2020 Test 1

You are allowed one page of notes and a calculator. No phones. More than 25pts to earn. For full credit please BOX your answers and show work. At least 150pts to earn here. Thanks!

**Problem 1:** (10pts) Find the equation of a line whose graph contains points (2, -1) and (0, 5).

**Problem 2:** (10pt) Multiply the following expressions and collect like power terms to give your answer as a polynomial in standard form:

$$(x+4)^2(x^2-1)$$

**Problem 3:** (10pt) Assume x, y > 0 and use laws of algebra to determine A, B as indicated below:

$$x^A y^B = \left(\frac{x^{-3}\sqrt{xy}}{(xy^3)^2}\right)^4$$

**Problem 4:** (10pt) Solve |2x + 3| + 2 = 13.

**Problem 5:** (20pt) **Factor** each f(x) given below completely over  $\mathbb{R}$ :

(a.) 
$$f(x) = x^3 - 9x^2 + 20x$$

**(b.)** 
$$f(x) = x^4 - 13x^2 + 36$$

**Problem 6:** (10pt) Solve |4-3x| < 10 and write your answer in interval notation.

**Problem 7:** (10pts) Use completing the square and algebra as needed to place the circle equation below into standard form. Find the center and radius of the circle.

$$x^2 - 14x + y^2 + 25y = 1$$

**Problem 8:** (30pt) For each quadratic polynomial f(x) given below, complete the square and find all real or complex solutions of f(x) = 0:

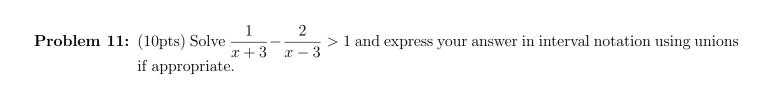
(a.) 
$$f(x) = 3x^2 + 12x + 15$$
,

**(b.)** 
$$f(x) = x^2 - 6x - 2$$
.

**Problem 9:** (10pt) Find real numbers a, b for which  $a + ib = \frac{26}{2+3i}$ .

**Problem 10:** (20pts) Solve the following inequality using an appropriate technique. Show your work and write the answer using interval notation (you might need to use  $\cup$  for union )

$$\frac{(x+6)^3}{x^2(x-4)^5} \ge 0$$



**Problem 12:** (10pt Bonus) Let P = (2,0) and Q = (8,6) and R = (3,3) be vertices of a triangle. Find the area and perimeter of this triangle.