NAME _____

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 $a + ib = \dfrac{26}{2 + 3i}$.

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)

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

Problem 11: (10pts) Solve $\dfrac{1}{x+3} - \dfrac{2}{x-3} > 1$ and express your answer in interval notation using unions if appropriate.

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.