MATH-1320 Name _____
Exam 2
Fall 2021 Rocket Number _____

INSTRUCTIONS: You must show enough work to justify your answer on **ALL** problems. Correct answers with no work (or inconsistent work) shown **will not** receive full credit. **All answers are to be exact; no decimal approximations.** You can either print this exam and work the problems in the provided spaces or you can work each problem on your own paper. **If you do not print the exam, do not waste time by writing the problems and put a box around your answer(s) for each problem.** You are **NOT** allowed to use any books nor supplementary material. You are only allowed to use an electronic device to open and print this exam, to take pictures of the papers with your work on it, and to submit these pictures through Blackboard. **NO CALCULATORS. IF A CALCULATOR IS USED FOR A PROBLEM, YOU WILL RECEIVE A ZERO FOR THE PROBLEM. IF I SUSPECT THAT THE WORK ON A PROBLEM IS NOT YOURS, YOU WILL BE ASKED TO EXPLAIN THE WORK IN ORDER TO RECEIVE CREDIT FOR THE PROBLEM.**

1. Find the domain of the function $g(x) = \sqrt{25 - 9x}$. Write your answer using interval notation. (4 pts.)

Answer _____

2. Write the equation of the circle in standard form given the following information. **Put a box around your answer.**

a. Center: $(-4, 0)$; Radius: $\sqrt{11}$ (4 pts.)

b. The center is $(3, -7)$ and the point $(-5, -2)$ is a point on the circle. (6 pts.)

3. Write the equation of the circle $x^2 + y^2 - 12x - 8y + 7 = 0$ in standard form. Then find the center and radius of the circle. (8 pts.)

Center _____ Radius _____

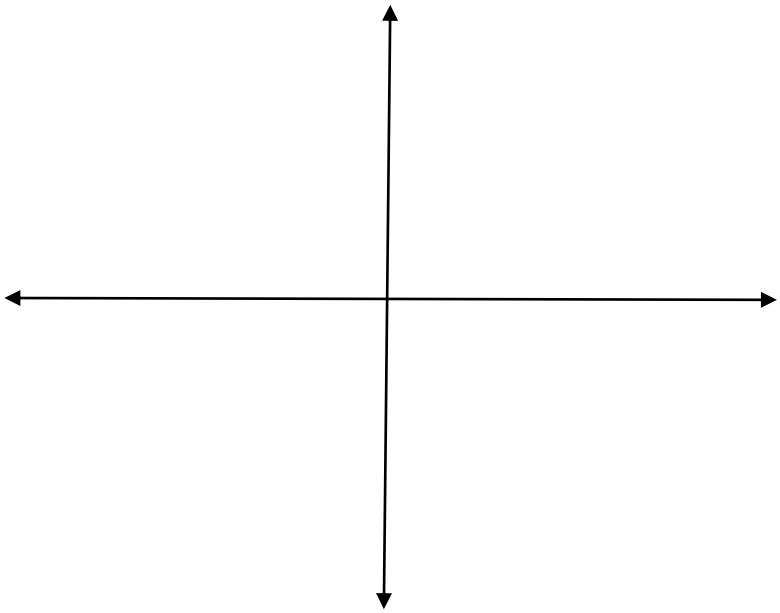
4. If $f(x) = 5x^2 - 3x$, then find the average rate of change of the function f on the interval $[4, 4 + h]$, where $h > 0$. (8 pts.)

Answer _____

5. If $f(x) = 2x - 3$ and $g(x) = x^2 - 9$, then find $(g \circ f)(x)$. (5 pts.)

Answer _____

6. Sketch the graph of $h(x) = -\dfrac{4}{7x + 12}$. Show any horizontal and/or vertical asymptotes. Label any *x*-intercept(s) and any *y*-intercept. (5 pts.)



7. Sketch the graph of the function $g(x) = 9(x - 6)^2 - 2$ and identify the following.

   a. horizontal shift _____ (2 pts.)

   b. vertical shift _____ (2 pts.)

   c. range of the function _____ (3 pts.)

   d. interval(s) on which the function *g* is increasing _____ (2 pts.)

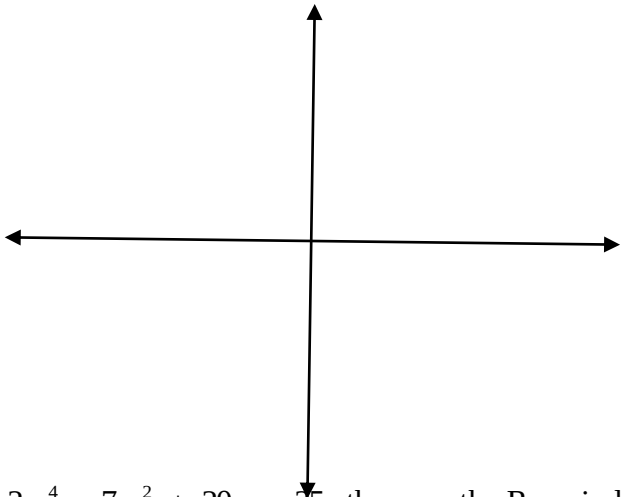
   e. interval(s) on which the function *g* is decreasing _____ (2 pts.)

   f. value of relative (local) maximum(s) and location(s) _____ (2 pts.)

   g. value of relative (local) minimum(s) and location(s) _____ (2 pts.)

   h. *x*-intercept(s) _____ (5 pts.)

   i. sketch: (3 pts.)



8. If $h(x) = 2x^4 - 7x^2 + 20x - 25$, then use the Remainder Theorem to find $h(-4)$. (5 pts.)

Answer _____

9. Identify the possible rational zeros (roots) of the polynomial $p(x) = 3x^4 - 2x^3 - 36x^2 + 72x - 32$. Then find the zeros (roots). Write a factorization for $p(x) = 3x^4 - 2x^3 - 36x^2 + 72x - 32$. (16 pts.)

Possible rational zeros (roots):

Zeros (Roots) _____

Factorization:

10. Solve $\frac{x + 6}{8x + 3} \leq 0$. Write your answer using interval notation. (8 pts.)

Answer _____

11. Find the zeros (roots) and their multiplicities of the polynomial $g(x) = (6x + 17)(3 - x)^5(x + 8)^2$. Determine what implication the multiplicity of the zero (root) has on the graph of the polynomial. Determine the sign of the infinity that the polynomial values approaches as x approaches positive infinity and negative infinity. (10 pts.)

Zero (Root) Multiplicity Implication on the Graph

As $x \to \infty$, $g(x) \to$ _____

As $x \to -\infty$, $g(x) \to$ _____