MATH-1320   Name_____

Exam 2

Fall 2022   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 are **NOT** allowed to use any electronic device for this exam.

1.   Find the domain of the function $f(x) = \dfrac{x^2 + 5x}{9 - x^2}$. 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: $(0, -6)$; Radius: $\sqrt{15}$ (4 pts.)

      b.   The endpoints of a diameter are $(-8, -3)$ and $(-12, 9)$.   (8 pts.)

3. Write the equation of the circle $x^2 + y^2 - 18x + 14y + 46 = 0$ in standard form. Then find the center and radius of the circle. (8 pts.)
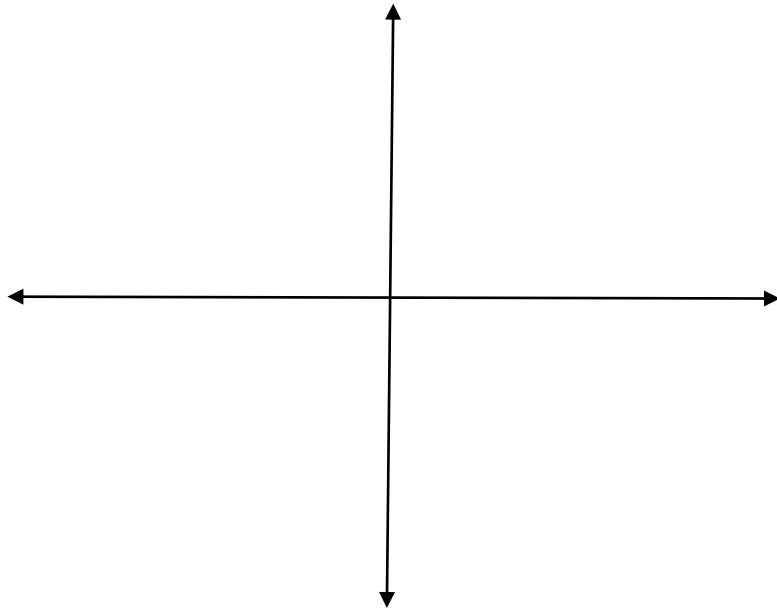
Center _____   Radius _____

4. If $g(x) = 4x^2 - 7x + 9$, then find the average rate of change of the function g on the interval $[3, 3 + h]$, where $h > 0$. (8 pts.)
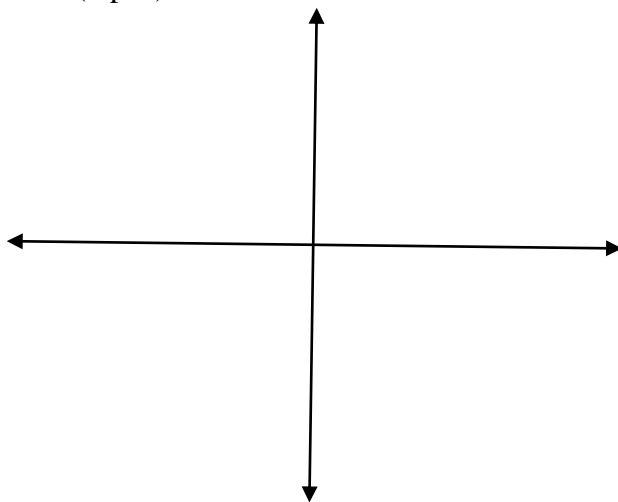
Answer _____

5. If $f(x) = 5x - x^2$ and $g(x) = 3x - 7$, then find $(f \circ g)(x)$. (5 pts.)

Answer _____

6.	Sketch the graph of $h(x) = \dfrac{3}{8x - 5} - 2$. Show any horizontal and/or vertical asymptotes. Label any x-intercept(s) and any y-intercept. (8 pts.)

7.	Sketch the graph of the function $g(x) = -4(x + 3)^2 + 8$ 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. y-intercept _____ (2 pts.)

	j.	sketch: (3 pts.)

8. If $h(x) = 2x^5 + 9x^4 - 15x^2 - 100x + 75$, then use the Remainder Theorem to find $h(-5)$.
(6 pts.)

Answer _____

9. Identify the possible rational zeros (roots) of the polynomial $p(x) = 3x^4 - 17x^3 + 20x^2 + 28x - 48$.
Then find the zeros (roots). Write a factorization for $p(x) = 3x^4 - 17x^3 + 20x^2 + 28x - 48$.
(16 pts.)

Possible rational zeros (roots):

Zeros (Roots) _____

Factorization:

+

10. Write the quadratic function $y = -3x^2 - 8x + 4$ in standard form. Then identify the vertex and the axis of symmetry. (8 pts.)

Vertex _____   Axis of Symmetry _____

11. Find the zeros (roots) and their multiplicities of the polynomial $f(x) = (15 - 4x)(7 - x)^4(x^2 + 6)$. 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 $x \to \infty$, $f(x) \to$ _____

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

12. Use your answer in Problem 4 to predict the slope of the tangent line to the graph of the function $g(x) = 4x^2 - 7x + 9$, at the point for which $x = 3$. (3 pts.)

Answer _____