MATH 107 QUIZ 4 **Summer**, 2017 Instructor: Dr. J. Wulu

NAME: _____

I have completed this assignment myself, working independently and not consulting anyone except the instructor.

INSTRUCTIONS

- The quiz is worth 100 points. There are 13 problems. This quiz is ***open book*** and ***open notes***. This means that you may refer to your textbook, notes, and online classroom materials, but ***you must work independently and may not consult anyone*** (and confirm this with your submission). You may take as much time as you wish, provided you turn in your quiz no later than **Monday, July 3**.
- **Show work/explanation where indicated. Answers without any work may earn little, if any, credit.** You may type or write your work in your copy of the quiz, or if you prefer, create a document containing your work. Scanned work is acceptable also. **In your document, be sure to include your name and the assertion of independence of work.**
- General quiz tips and instructions for submitting work are posted in the Quizzes module.
- If you have any questions, please contact me by e-mail.

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I certify the work submitted on and with this document represents my own personal work. I have not collaborated with, or consulted with, anyone else to produce the work I am submitting. I certify I have not used any instructor solutions manuals, or any online problem solving services. I understand and agree to abide by UMUC Policy on Academic Dishonesty and Plagiarism.

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Student Signature & Date

1. (4 pts) Solve the inequality $n^2 \geq 7n$ and write the solution set in interval notation. (no explanation required) 1. _____

A. $[7, \infty)$
B. $(-\infty, 0] \cup [7, \infty)$
C. $(-\infty, 7] \cup [0, \infty)$
D. $[0, 7]$

2. (4 pts) Solve $\dfrac{n+3}{n^2-7n+6} \leq 0$ and write the solution set in interval notation. 2. _____

(no explanation required)

A. $(1, 6)$
B. $(-\infty, -3]$
C. $(-\infty, -3] \cup (1, 6)$
D. $[-3, 1) \cup (6, \infty)$

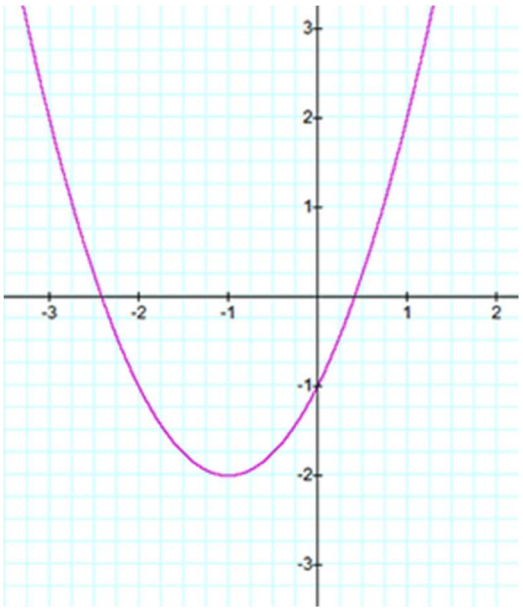
3. (4 pts) For $g(x) = x^3 - 2x^2 - 7$, use the Intermediate Value Theorem to determine which interval must contain a zero of g. (no explanation required) 3. _____

A. Between 0 and 1
B. Between 1 and 2
C. Between 2 and 3
D. Between 3 and 4

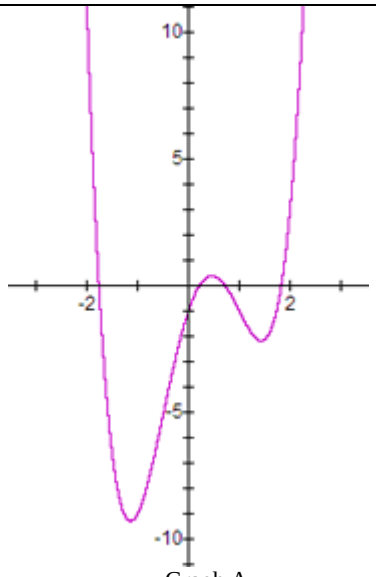
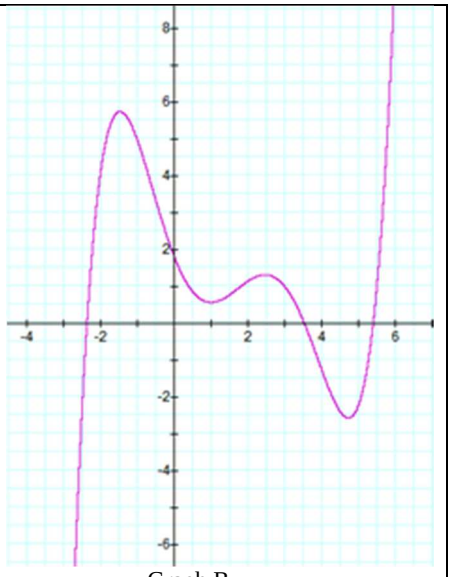
4. (4 pts) Translate this sentence about area into a mathematical equation.
The area *A* of a regular pentagon is directly proportional to the square of the length *s* of its sides.

_____

5. (8 pts) Look at the graph of the quadratic function and complete the table. **[***No explanations required.***]**

Graph	**Fill in the blanks**	**Equation**
	State the vertex: _____ State the range: _____ State the interval on which the function is decreasing: _____	The graph represents which of the following equations? **Choice:____** A. $y = -x^2 + 2x - 1$ B. $y = -2x^2 - 4x + 1$ C. $y = 2x^2 + 4x - 1$ D. $y = x^2 + 2x - 1$

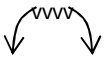
6. (6 pts) Each graph below represents a polynomial function. Complete the following table.
(no explanation required)

Graph	 Graph A	 Graph B
Is the degree of the polynomial **odd** or **even**? (choose one)		
Is the leading coefficient of the polynomial **positive** or **negative**? (choose one)		
How many real number zeros are there?		

7. (12 pts) Let $P(x) = -x^3 + 4.5x^2 - 0.5x - 6$ When factored, $P(x) = -(x+1)\left(x - \frac{3}{2}\right)(x-4)$

(a) State the domain.

(b) Which sketch illustrates the **end behavior** of the polynomial function?

A.	B.	C.	D.
			

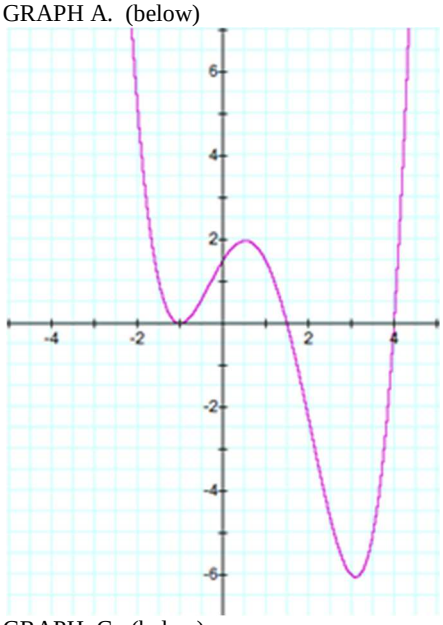
Answer: _____

(c) State the *y*-intercept:

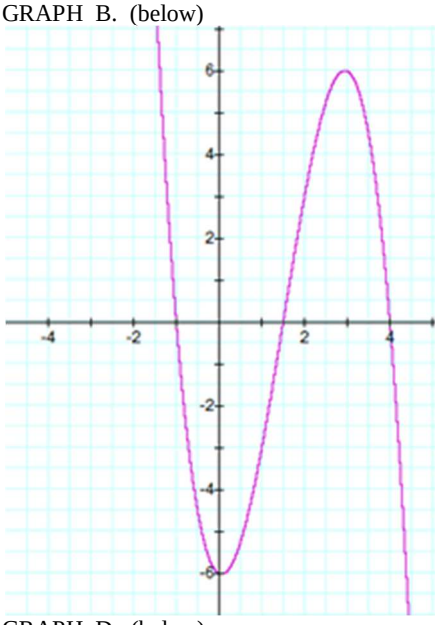
(d) State the real zeros:

(e) State which graph below is the graph of *P*(*x*).

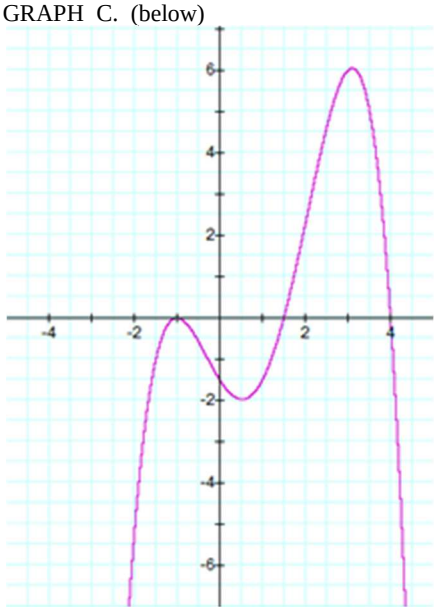
GRAPH A. (below)



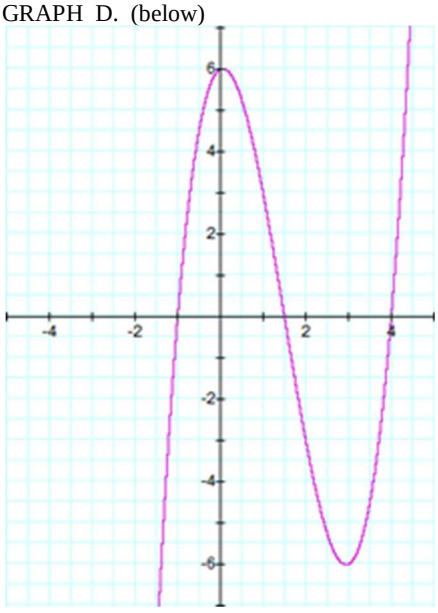
GRAPH B. (below)



GRAPH C. (below)



GRAPH D. (below)



8. (8 pts) Let $f(x) = \dfrac{4x^2 - 4}{x^2 - 9}$. (no explanations required)

(a) State the *y*-intercept.

(b) State the *x*-intercept(s).

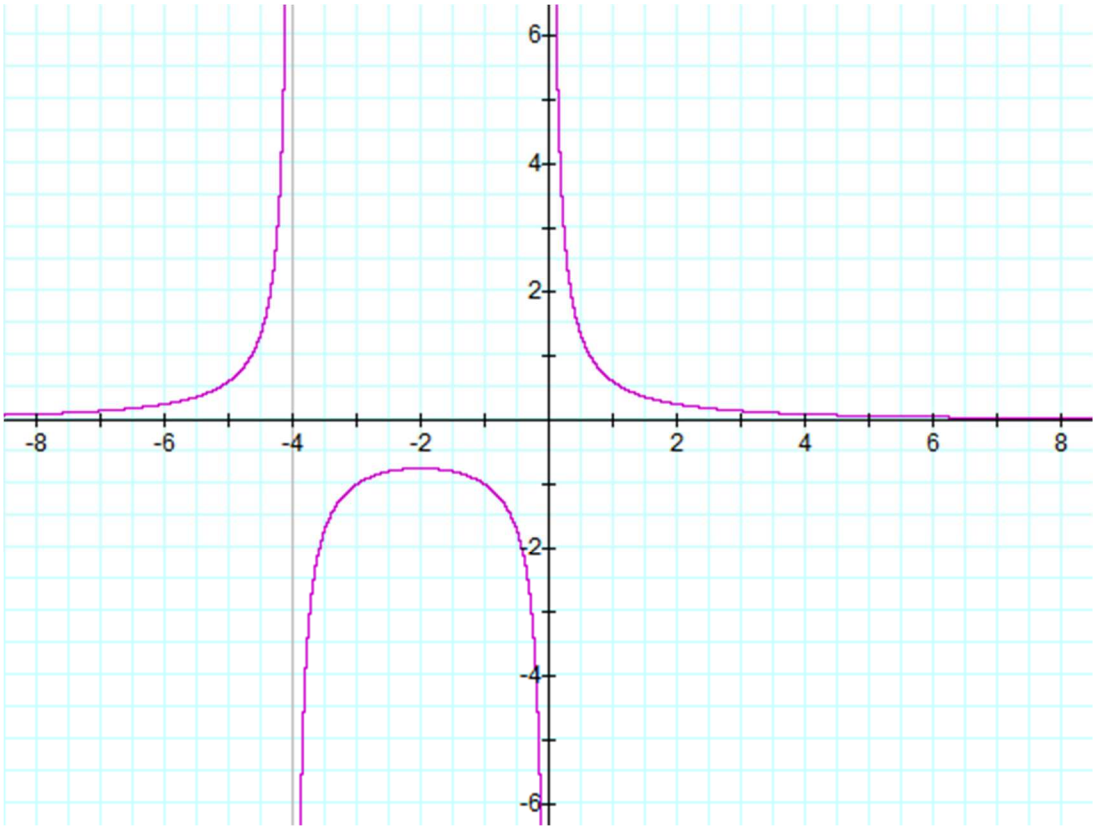
(c) State the vertical asymptote(s).

(d) State the horizontal asymptote.

9. (8 pts) Solve the equation. *Check* all proposed solutions. Show work in solving and in checking, and state your final conclusion.

$$\frac{x+1}{x-2} - \frac{6}{x^2 - 2x} = 0$$

10. (8 pts) Which of the following functions is represented by the graph shown below? **Explain** your answer choice. Be sure to take the asymptotes into account in your explanation.



10. _____

A. $f(x) = \frac{x^2}{x^2 - 16}$

B. $f(x) = \frac{3}{x^2 - 16}$

C. $f(x) = \frac{x}{x^2 - 4x}$

D. $f(x) = \frac{3}{x^2 + 4x}$

11. (8 pts) For $z = 4 - 3i$ and $w = 7 - i$, find z/w. That is, determine $\frac{4-3i}{7-i}$ and simplify as much as possible, writing the result in the form $a + bi$, where a and b are real numbers. **Show work**.

12. (8 pts) Consider the equation $5x^2 + 20 = 16x$. Find the complex solutions (real and non-real) of the equation, and simplify as much as possible. **Show work.**

13. (18 pts)
The cost, in dollars, for a company to produce x widgets is given by $C(x) = 5250 + 7.00x$ for $x \geq 0$, and the price-demand function, in dollars per widget, is $p(x) = 45 - 0.02x$ for $0 \leq x \leq 2250$.

In Quiz 2, problem #10, we saw that the profit function for this scenario is
$$P(x) = -0.02x^2 + 38.00x - 5250.$$

(a) The profit function is a quadratic function and so its graph is a parabola.

Does the parabola open up or down? _____

(b) Find the vertex of the profit function $P(x)$ using algebra. **Show algebraic work**.

(c) State the maximum profit and the number of widgets which yield that maximum profit:

The maximum profit is _____ when _____ widgets are produced and sold.

(d) Determine the price to charge per widget in order to maximize profit.

(e) Find and interpret the break-even points. **Show algebraic work.**