

By providing my signature below I acknowledge that I abide by the University's academic honesty policy. This is my work, and I did not get any help from anyone else during the exam:

Name (sign): _____

Name (print): _____

Student Number: _____

Instructor's Name: _____

Class Time: _____

Problem Number	Points Possible	Points Made
1	15	
2	15	
3	15	
4	15	
5	15	
6	10	
7	15	
Total:	100	

- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- If you make use of a theorem to justify a conclusion then state the theorem used by name.
- Your work must be **neat**. If I can't read it (or can't find it), I can't grade it.
- The total number of possible points that is assigned for each problem is shown here. The number of points for each subproblem is shown within the exam.
- Please turn off your mobile phone.
- A calculator is not necessary, but numerical answers should be given in a form that can be directly entered into a calculator.

1. Use the function below to answer questions 1(a), 1(b), and 1(c). Keep your numeric values exact.

$$f(x) = \frac{\sqrt{x} - 5}{x^2 - 9}$$

- _____ (a) [5 pts] Determine the ***x*-intercept(s)** of $f(x)$.

- _____ (b) [5 pts] Determine the **domain** of $f(x)$. Give your answer in interval notation.

- _____ (c) [5 pts] The function $g(x)$ is created by moving $f(x)$ one unit to the left. Determine the formula for $g(x)$. You do not have to simplify your function.

2. Use the function below to answer questions 2(a), 2(b), and 2(c). Keep your numeric values exact.

$$f(x) = 4x^2 - 12x + 5$$

- _____ (a) [5 pts] Determine the ***x*-intercept(s)** of $f(x)$.

- _____ (b) [5 pts] Determine the ***y*-intercept(s)** of $f(x)$.

- _____ (c) [5 pts] Determine the **range** of $f(x)$. Give your answer in interval notation.

3. A point P has coordinates $(3, -5)$. Answer the following.

(a) [5 pts] Let point Q be at the origin. Determine the length of the line segment \overline{PQ} .

(b) [5 pts] Determine an equation for the line **perpendicular** to $4x + 3y = 7$ that contains the point P .

(c) [5 pts] Determine an equation for the **vertical line** containing the point P .

4. Let $f(x) = 3x - 2$ and $g(x) = 17 - x^2$. Answer the following:

(a) [5 pts] Compute $(f - g)(x)$. Simplify your answer completely.

(b) [5 pts] Compute $(f \circ g)(x)$. Simplify your answer completely.

(c) [5 pts] Compute $(g \circ f)(x)$. Simplify your answer completely.

5. A business has a monthly fixed cost of \$3500, which includes rent, utilities, and labor. They have a variable cost of \$1.55 per item that they produce. Define x as the number of items that they produce on a monthly basis. Use this information to answer the following:

_____ (a) [5 pts] Denote C as their total **monthly cost** (measured in dollars) of operations. Determine the formula for $C(x)$.

_____ (b) [10 pts] The company will break even when they sell exactly 2500 items. Determine what price they will need to set in order to make this happen.

6. Answer each of the questions below, and the function referred to is defined by

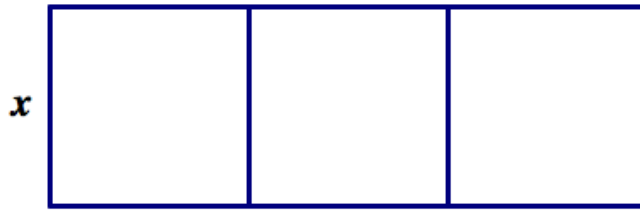
$$f(x) = \begin{cases} -3x - 4 & x < 2 \\ (x + 2)^3 - 4 & x \geq 2 \end{cases}$$

(a) [3 pts] Determine the value for $f(-2)$.

(b) [3 pts] Determine the value for $f(3)$.

(c) [4 pts] Determine the average rate of change of the function from $x = -2$ to $x = 3$.

7. A rectangular field will be fenced on all four sides. There will also be two lines of fence across the field, parallel to the shorter side, which has length x ft. (See diagram below.). Answer the following.



- (a) [6 pts] If 4400 ft of fencing are available to create the field, determine a function $A(x)$ that models the area of the rectangular field. (Notice that $A(x)$ is a function only of x .)
- (b) [9 pts] Determine the dimensions of the field will produce the maximum area.

Extra space for work. **Do not detach this page.** If you want us to consider the work on this page you should print your name, instructor and class meeting time below.

Name (print): _____ Instructor (print): _____ Time: _____