

## Exam 3

Student Name: \_\_\_\_\_  
Student ID#: \_\_\_\_\_

Each problem is worth 5 points. Give a complete solution to receive the full credit!

---

- Which of the following logarithms are defined?
  - $\log_{0.1} 10$
  - $\log_{0.000001} 3^{-7}$
  - $\log_1 3$
  - $\log_{10^{-3}} \pi$
  - $\log_3 0$
- If  $\log_a b = 5$ ,  $a > 0$ ,  $a \neq 1$ ,  $b > 0$ , and  $\log_3 a = 4$  find the value of  $\log_3 b$ .
- Let  $g(m) = m + 3$ . Find  $(g \circ g)(5)$ .

4. An inlet pump can fill a water tower in 15 hours and an outlet pump can empty the water tower in 20 hours. If both pumps are left open, how long will it take the water tower to fill?

5. Solve the following exponential equation:

$$700 = 400 - 2^{x-2}.$$

6. Solve the following logarithm equation:

$$7 - 2 \log(3 - x) = 9.$$

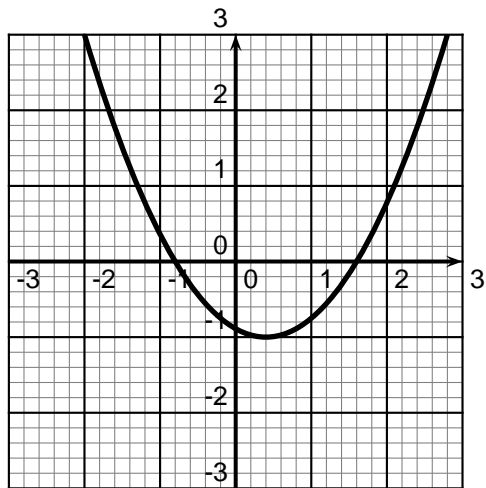
7. The function  $f$  is defined by

$$f(x) = \begin{cases} 3x - 1, & -3 \leq x < 0 \\ x^2 + 5, & 0 \leq x < 2 \\ -x, & 2 \leq x \leq 4 \end{cases}$$

find  $f(2)$ .

8. For the graph of the quadratic function  $j(x)$  given below, determine:

- (a) If the parabola is concave up or concave down.
- (b) If the parabola has a maximum or a minimum.
- (c) The equation of the axis of symmetry.
- (d) The coordinates of the vertex.
- (e) Estimated coordinates of the horizontal and vertical intercepts.



9. Consider the table giving values for height and weight of 5 individuals. Determine

Height	61	73	63	66	63
Weight	146	174	121	126	138

which of the following best describes the relationship between height and weight.

- Height is a function of weight.
  - Weight is a function of height.
  - Height is a function of weight and weight is a function of height.
  - None of the above.
10. Market research suggests that if a particular item is priced at  $x$  dollars, then the weekly profit  $P(x)$ , in thousands of dollars, is given by the function

$$P(x) = -10 + \frac{13}{2}x - \frac{1}{2}x^2.$$

- (a) What price range would yield a profit for this item?
- (b) What is the maximum profit?