

# SAMPLE

Math 99

Final

Name: \_\_\_\_\_

**Directions:** Please show all your work to receive credit. You will be graded on the clarity and organization of your work as well as its accuracy. All problems must be solved algebraically to receive credit. Clearly define all variables (with units) you introduce in a word problem and **answer each word problem with a concluding sentence**. You may **not** use a calculator on this test. **Do all your work on another sheet of paper.**

1. Evaluate each of the following expression. Identify those that are not real numbers.

- a.  $\log_2 16$       b.  $\log_3 1$       c.  $\log_8 \frac{1}{2}$       d.  $\log_3 \sqrt{3}$       e.  $8^{-2/3}$       f.  $-4^{-2}$   
 g.  $|-4|$       h.  $3^{-2} + 6^{-1}$       i.  $64^{1/2}$

2. If  $f(x) = 3 - |x - 6|$ , evaluate  $f(-1)$ .

3. Solve each of the following equations or inequalities. Express your answers in simplest form using set notation. Give exact answers.

a.  $8 - \frac{2}{5}x > 1$

b.  $29 - 3(x + 135)^2 = 2$

c.  $x^2 = 13x - 12$

d.  $6e^{8x} = 24$

e.  $2(3^{x+1}) - 5 = 7$

4. Multiply:  $(x - 3)^2$ .

5. Find an equation of the line through the points  $(-1, -2)$  and  $(-5, 8)$ .

6. Graph the function  $y = f(x) = -x^2 + 4x + 20$ . Label the exact coordinates of all intercepts. State the domain and range of the function.

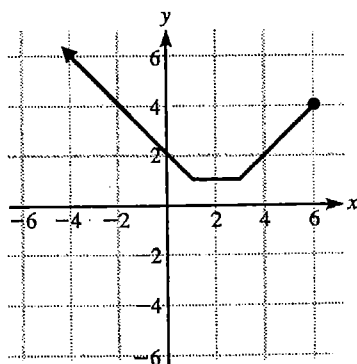
7. Let  $f(x) = \frac{8}{x-4} - 6x$ . Solve the equation  $f(x) = f(0)$ .

8. Use the graph of  $y = f(x)$  shown here to answer parts (a)-(c) below.

a. State the domain of this function using interval notation.

b. Evaluate  $f(4)$ .

c. Solve:  $f(x) = 4$ .



9. Igor can row a boat at a speed of 4 mph in still water. If it takes him three times as long to row 6 miles upstream as it does to row 7 miles downstream, find the speed of the current.

10. You invest \$2,000 at an annual rate of 5%, compounded annually. How long does it take your investment to triple? Give an exact answer.

11. In the Bogart temperature scale, a temperature of  $20^{\circ}\text{C}$  corresponds to a temperature of  $33^{\circ}\text{B}$  and a temperature of  $100^{\circ}\text{C}$  corresponds to a temperature of  $93^{\circ}\text{B}$ . Express the Celsius temperature  $C$  in terms of the corresponding Bogart temperature  $B$ .

12. The distance (in miles) of a car from Seattle  $t$  hours after 2:00 pm is given by the function

$$D(t) = |40t - 85|, \quad 0 \leq t \leq 5$$

Find all times when the car is 75 miles from Seattle.

13. The height of a ball (in feet)  $t$  seconds after being released on the planet Xerxes is given by the function

$$h(t) = -4t^2 + 44t + 3$$

a. When is the ball 123 feet above the ground?

b. Find the height of the ball 5 seconds before it reaches its highest point.