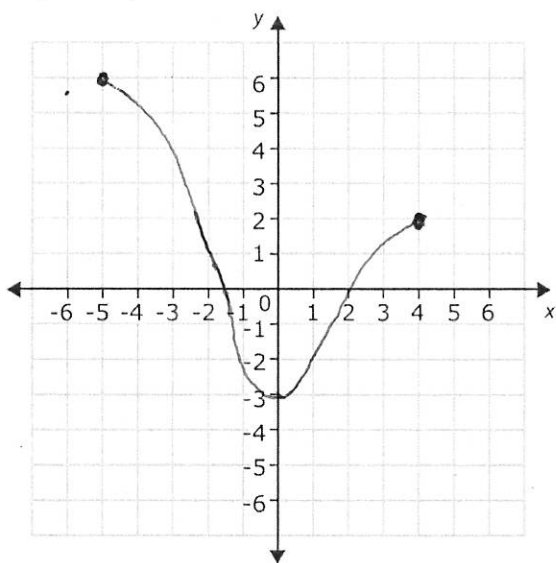


NAME: \_\_\_\_\_ INSTRUCTOR: \_\_\_\_\_ SCORE: \_\_\_\_\_

Remember to show all of the appropriate work or you might not earn credit. Please write all answers in the spaces provided on the right side of the page, unless otherwise indicated.

1. a) Find the domain and range of the function  $f(x)$  graphed below. Each space on the grid represents one unit.



Domain: \_\_\_\_\_ (2 pts)

Range: \_\_\_\_\_ (2 pts)

- b) Use the graph above to find  $f(-2)$ .

b) \_\_\_\_\_ (1 pt)

- c) Use the graph above to find  $x$  when  $f(x) = 4$ .

c) \_\_\_\_\_ (1 pt)

2. Give the slope-intercept form of the line that passes through the point  $(6, 3)$  and is perpendicular to the line  $3x + 4y = 20$ .

2. \_\_\_\_\_ (5 pts)

3. The table below shows the population (in millions) of a country each year from 2007 to 2011. The population decreases approximately linearly.

Year	2007	2008	2009	2010	2011
Population (in millions)	7.58	7.23	7.18	6.99	6.80

a) Let  $x = 0$  in the year 2007 and let  $y$  represent the population in year  $x$ . Using the years 2007 and 2011, find a linear equation that models the data.

a) \_\_\_\_\_ (5 pts)

b) Use the equation to predict the population in the year 2022.

b) \_\_\_\_\_ million (2 pts)

c) Write a sentence to interpret the meaning of the slope of the linear equation.  
(3 pts)

4. Simplify this expression as much as possible. Your answer should not include any negative exponents. Write your answer as a fraction.

$$\left( \frac{2x^5x^{-3}}{x^4} \right)^{-2}$$

4. \_\_\_\_\_ (5 pts)

5. Find the slope of each line.

a)  $x = -3$

a) \_\_\_\_\_ (1 pt)

b)  $y = 5$

b) \_\_\_\_\_ (1 pt)

6. A 6000-seat theater has tickets for sale at \$25 and \$42. A sellout performance generates a total revenue of \$204,400.

a) Let  $x$  represent the number of \$25 tickets sold and let  $y$  represent the number of \$42 tickets sold. Write a system of equations that could be used to find the number of each type of ticket sold.

Equation 1: \_\_\_\_\_ (1 pt)

Equation 2: \_\_\_\_\_ (1 pt)

b) Solve the system to find the number of each type of ticket sold.

Number of \$25 tickets: \_\_\_\_\_ (2 pt)

Number of \$42 tickets: \_\_\_\_\_ (2 pt)

7. Find an equation in the form  $y = ab^x$  of the exponential curve that contains the points (0, 3.5) and (7, 57344).

7. \_\_\_\_\_ (5 pts)

8. Solve the equation. You must show all of the steps to earn credit.

$$6\log_3 x - 7 = 17$$

8.  $x =$  \_\_\_\_\_ (5 pts)

9. Calculate the value of each expression, rounded to at least three decimal places.

a)  $\log_7 3300$

a) \_\_\_\_\_ (1 pt)

b)  $\sqrt[6]{4234}$

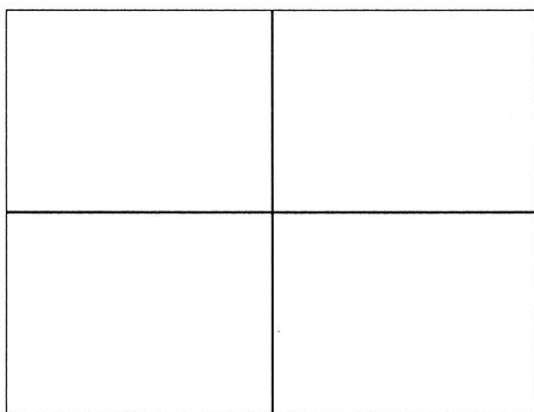
b) \_\_\_\_\_ (1 pt)

10. a) Use your calculator to draw the graphs of these functions on a  $[-3, 3]$  by  $[-8, 8]$  window. This means that  $X_{\min} = -3$ ,  $X_{\max} = 3$ ,  $Y_{\min} = -8$ , and  $Y_{\max} = 8$ .

Draw the picture of your graph in the space below. (4 pts)

$$f(x) = x^5 - 4x^3 + 6x$$

$$g(x) = 3e^{-2x} + 1.5$$



b) Use your calculator to find the coordinates of the point where the graphs intersect. Your answers should be accurate to at least three decimal places.

(\_\_\_\_\_, \_\_\_\_\_) (2 pts)

11. Solve for  $x$ . Write your answers in simplified radical form.

$$4x^2 - 10x = 3$$

11. \_\_\_\_\_ (5 pts)

12. Betty frequently flies a helicopter between three cities. Smallville is about 53 miles almost directly north of Parktown, and Lake City is almost directly west of Parktown. The distance between Lake City and Smallville is about 71 miles. What would be the total distance of a helicopter trip from Parktown to Smallville to Lake City to Parktown? Round your answer to the nearest mile.

12. \_\_\_\_\_ miles (5 pts)

13. Find all solutions to the equation.

$$\sqrt{3x+1} - x = -3$$

13. \_\_\_\_\_ (5 pts)

14. The force,  $F$ , needed to break a board is inversely proportional to the length,  $L$ , of the board. If it takes 24 pounds of force to break a board that is 2 feet long, how much force would be needed to break a board that is 5 feet long? Remember to include correct units with your answer.

14. \_\_\_\_\_ (5 pts)  
                    number                      units

15. The profit in dollars,  $P$ , for an item with a selling price of  $D$  dollars is given by the formula  $P = -45D^2 + 2700D - 8000$ .

a) Find the selling price that will generate the maximum profit.

a) \_\_\_\_\_ dollars (2 pts)

b) Find the maximum profit.

b) \_\_\_\_\_ dollars (2 pts)

16. Simplify each expression as much as possible. Give exact answers, not decimals. Assume each variable is nonnegative.

a)  $\sqrt{45w^6y^{11}}$

a) \_\_\_\_\_ (3 pts)

b)  $(4\sqrt{x} + \sqrt{7})(4\sqrt{x} - \sqrt{7})$

b) \_\_\_\_\_ (3 pts)

17. Find all solutions to the equation

$$\frac{3}{x+5} - \frac{5}{x-4} = \frac{-27}{x^2 + x - 20}$$

17. \_\_\_\_\_ (5 pts)

18. Simplify this expression as much as possible.

$$\frac{3x^2 - 27}{12x^2 + 18x - 54}$$

18. \_\_\_\_\_ (4 pts)

19. Perform the operation. Simplify the result.

$$\frac{x}{x^2 + 8x + 15} - \frac{3}{x^2 + 6x + 5}$$

19. \_\_\_\_\_ (5 pts)

20. Write as a single logarithmic expression.

$$3\log_4 x - \log_4 y - 2\log_4 7$$

20. \_\_\_\_\_ (4 pts)