

Name _____

1. (5 points) Solve the equation $\sqrt{2x-3} = 3 - x$. Be careful to check for extraneous solutions.

2. (6 points) Find an equation of a line that is perpendicular to the line $3x + 4y = 5$ that goes through the point $(-3 , 4)$. Write your answer in slope-intercept form.

3. (6 points) The endpoints of the diameter of a circle are $(7 , 2)$ and $(1 , -6)$. Find the center and radius of the circle. Then write the equation of the circle.

Center: _____

Radius: _____

Equation: _____

4. (7 points) The entire graph of function f is shown.

Find the following:

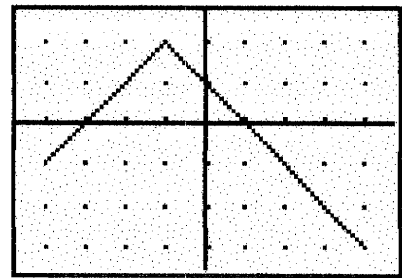
a. $f(3) =$ _____

b. Write, as an ordered pair, the x-intercept and y-intercept of f .

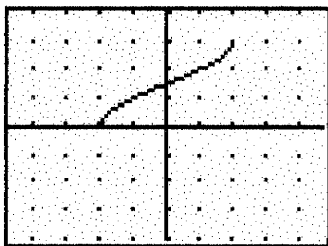
x-intercept(s): _____ y-intercept: _____

c. The domain and range of f .

Domain: _____ Range: _____



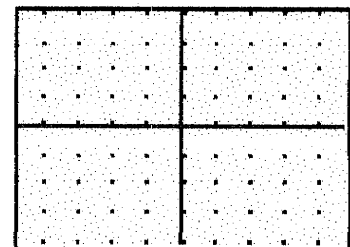
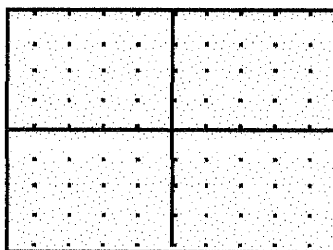
5. The entire graph of function g is shown below.



(3 points each) Sketch the graph of the functions:

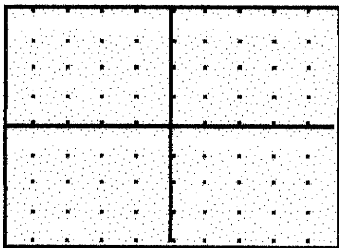
a. $y = g(x+1) - 3$

b. $y = g^{-1}(x)$, the inverse of $g(x)$.

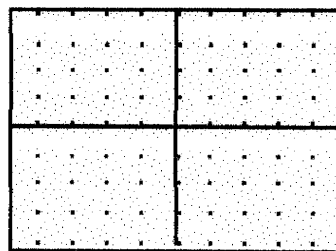


6. (3 points each) Sketch a graph of the following functions.

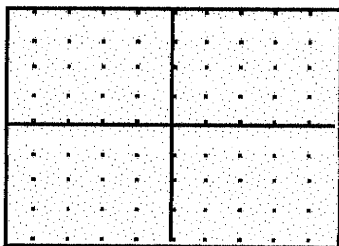
a. $f(x) = 2|x - 2|$



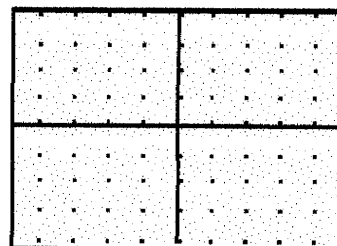
b. $f(x) = -\sqrt{x} + 1$



c. $f(x) = \left(\frac{3}{4}\right)^x - 2$



d. $f(x) = -\ln x$



7. (4 points) If $f(x) = 4x^2 - 4x - 3$, algebraically find the coordinates of the vertex.

8. (5 points) If $f(x) = 3x - 2$ and $g(x) = \frac{4x+1}{2x-3}$, find the following.

a. $f(g(1)) =$ _____

b. $g(f(x)) =$ _____

9. (6 points) The graph of $f(x) = -2\sqrt{x+3}$ can be obtained from the graph of $g(x) = \sqrt{x}$. State the transformations that you would apply to function g to obtain the graph of f .

10. (4 points) Write $\frac{5-i}{2+2i}$ in the form $a + bi$.

11. (5 points) Given that the roots of polynomial function f of degree 3 are $x = -2$, $x = 4i$, and $x = -4i$,

a. Write an expression, in factored form, of f . $f(x) =$ _____

b. Write f in standard form. $f(x) =$ _____

12. (12 points) Given $f(x) = \frac{x^2 - 4}{2x^2 - x - 1}$.

a. Write the intercepts (as ordered pairs). x-intercepts: _____

y-intercept: _____

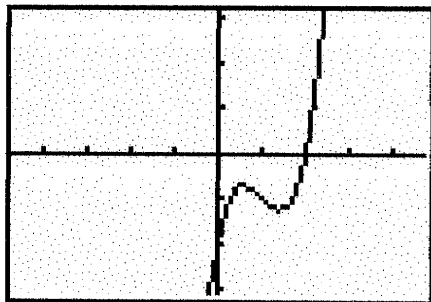
b. Write equations of the asymptotes. Horizontal asymptotes: _____

Vertical asymptotes: _____

13. (7 points) Given the function $f(x) = 2x^3 - 6x^2 + 5x - 2$.

a. Using the Rational Zero Theorem, list all possible rational zeros of f .

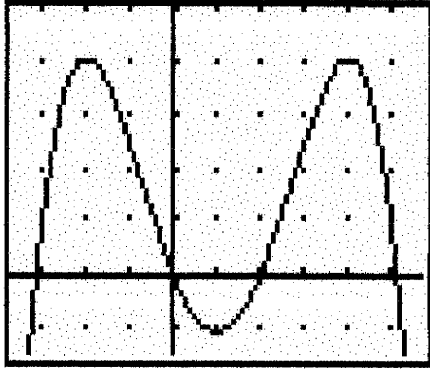
b. The complete graph of f is shown below.



c. The real zero of f is _____

d. Find the remaining complex zeros.

14. (10 points) Given the graph of f shown below



a. Find all local maximum and minimum values of f .

Max: _____ Min: _____

d. Write the intervals where f is increasing and decreasing.

Increasing: _____

Decreasing: _____

15. (5 points) If $f(x) = \frac{4x}{x+1}$, find $f^{-1}(x)$. $f^{-1}(x) =$ _____

16. (2 points) Write the exponential equation $t^n = y$, in its logarithmic form. _____

17. (3 points each) Find the exact value of the following logarithmic expressions.

a. $\log_5\left(\frac{1}{125}\right) =$

b. $\log 80 + \log 125 =$

c. $\log_8 32 =$

18. (4 points) Solve the following equation. Be sure to show all work. Leave your answer in terms of logarithms.

$$3^{2x-5} = 40$$

19. (5 points) Algebraically, solve the following equation. Be sure to show all work.

$$\log_2 x + \log_2(x-3) = 2$$

20. (6 points) Nuclear energy derived from radioactive isotopes can be used to supply power to space vehicles. Suppose that the output of the radioactive power supply for a certain satellite is given by the function defined by:

$$y = 40e^{-.004t}, \text{ where } y \text{ is measured in watts and } t \text{ is the time in days.}$$

- What is the initial output of the power supply? _____
- Find the number of days until the output will be reduced to 35 watts. Leave your answer in terms of logarithms.

21. (5 points) Radium 226 decays according to the exponential model $A(t) = A_0e^{kt}$, where t is time in years. There is initially 10 grams of Radium 226, and half of it decays in 1612 years (the half-life). Find the value of k . Leave your answer in terms of logarithms.

22. (5 points) Solve the system of equations
$$\begin{cases} 4x - 5y = -19 \\ 3x + 7y = 18 \end{cases}$$

23. (5 points) Heather has saved \$177 to take with her on the family vacation. She has 51 bills consisting of \$1, \$5, and \$10 bills. The number of \$5 bills is three times the number of \$10 bills. Write a system of equations you could use to find the number of \$1 bills (x), the number of \$5 bills (y), and the number of \$10 bills that Heather has saved. Then write the system as an augmented matrix. (You do not need to solve the system of equations.)

System:

Matrix:

24. (3 points each) Evaluate each of the following matrix problems. If a problem can not be done, write "NOT POSSIBLE".

$$\text{Let } A = \begin{bmatrix} -2 \\ 1 \\ 3 \end{bmatrix}, \quad B = \begin{bmatrix} 4 \\ -2 \\ -1 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 0 & -2 \\ 2 & 3 & -1 \\ 2 & -1 & 0 \end{bmatrix}, \quad D = [-2 \ 3 \ 1]$$

a. $3A - B =$

b. $A \cdot D =$

c. $C \cdot A =$