

Extra Practice
Pre-Calculus (Units 1-4)

Name _____

For the following problems, use a calculator only when absolutely necessary.

Determine whether the formula determines y as a function of x . If not, explain why not.

1. $y = \sqrt{x - 4}$

2. $x = 2y^2$

Find the domain and range of the function algebraically and support your answer graphically.

3. $f(x) = x^2 + 4$

4. $f(x) = \frac{3x-1}{(x+3)(x-1)}$

5. $g(x) = \frac{x}{x^2-5x}$

6. $h(x) = \frac{\sqrt{4-x}}{(x+1)(x^2+1)}$

Algebraically prove whether the function is odd, even, or neither.

7. $f(x) = \sqrt{x^2 + 2}$

8. $f(x) = -x^2 + 0.03x + 5$

9. $g(x) = 2x^3 - 3x$

Confirm that f and g are inverses by showing that $f(g(x)) = x$ and $g(f(x)) = x$.

10. $f(x) = 3x - 2$ and $g(x) = \frac{x+2}{3}$

11. $f(x) = x^3 + 1$ and $g(x) = \sqrt[3]{x-1}$

Algebraically find all horizontal and vertical asymptotes of the function.

12. $f(x) = \frac{x}{x-1}$

13. $g(x) = \frac{x+2}{3-x}$

14. $f(x) = \frac{x^2+2}{x^2-1}$

15. Using the graph shown below, give the characteristics, in interval notation, of the graph.

A. Intervals Where Increasing _____

B. Intervals Where Decreasing _____

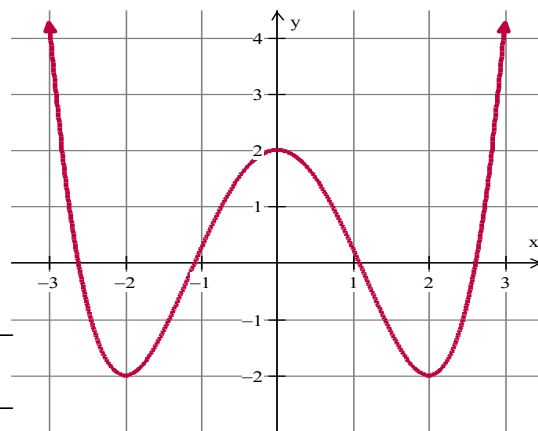
C. Local Maximum(s) _____

Local Minimum(s) _____

D. Domain _____

E. Range _____

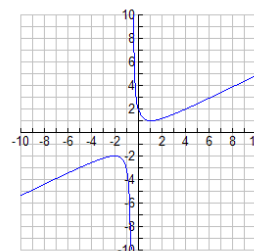
F. Boundedness (above, below, both, or neither) _____



16. Use proper limit notation to write the end behaviors for the graph of the function.

Left End Behavior:

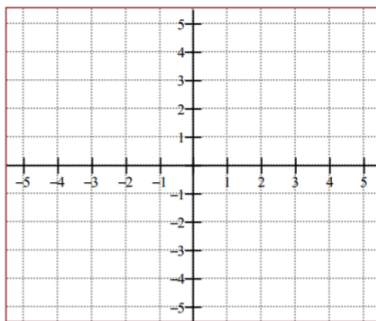
Right End Behavior:



17. Accurately graph the following piecewise defined functions. Plot points first!

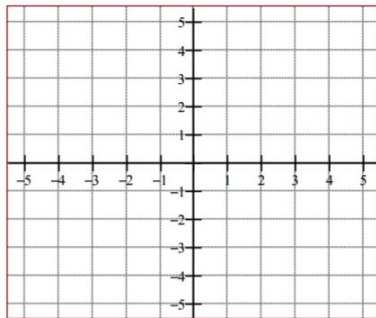
a)

$$f(x) = \begin{cases} 5, & \text{if } x < -2 \\ -x^2, & \text{if } -2 \leq x < 2 \\ x-2, & \text{if } x \geq 2 \end{cases}$$



b)

$$f(x) = \begin{cases} \frac{1}{2}x, & \text{if } x \leq 1 \\ |x-2|-2, & \text{if } x > 1 \end{cases}$$



c) Evaluate using the piecewise function above (part b):

$f(-1) =$ $f(0) =$ $f(1) =$ $f(2) =$ $f(3) =$

18) Find two functions defined implicitly by the given relation.

a) $x - y^2 = -7$

b) $4x^2 - 4xy + y^2 = 4$

19) Use completing the square to determine the vertex form and axis of symmetry for the graph of the quadratic function.

a) $f(x) = 3x^2 - 3x - 7$

b) $f(x) = -5x^2 + 25x - 12$

20) Given the vertex of a parabola (-3, 4) and another point on the parabola (4, 1), find a, then write the equation of the parabola in vertex form.

21) Find the zeroes of the function algebraically.

a) $f(x) = x^2 + 2x - 8$

b) $f(x) = 3x^3 - x^2 - 2x$

c) $f(x) = x^4 - x^3 - 7x^2 + 5x + 10$

d) $f(x) = 5x^3 - 24x^2 + x + 12$

22) Solve the equation algebraically. Support your answer numerically and identify any extraneous solutions.

a) $2 - \frac{1}{x+1} = \frac{1}{x^2+x}$

b) $\frac{3x}{x+5} + \frac{1}{x-2} = \frac{7}{x^2+3x-10}$

23) Evaluate the following logarithms:

- a) $\log_5 125$ b) $\log_4 \frac{1}{2}$ c) $\log 1,000,000$ d) $\log_b 1$ e) $\ln(e^x)$

24) Solve for x in the following logarithmic or exponential equations:

- a) $3^{x+5} = 27^{-2x+1}$ b) $\log(1 - x) - \log(1 + x) = 2$ c) $\log_4 x - 5 = 3$

25) What is the equation of an exponential function whose initial value is 12 that also passes through the point (2,3) ?

26) The current population of Lovejoy High School is approximately 950 students, and the population is growing at about 4.5% per year.

- a) What is the exponential model for this scenario?
- b) What is the growth factor?
- c) What is the growth rate?
- d) If the population continues to grow exponentially at this rate, how long until the population is 1,380 students?

27) What is the equation of a logistic function whose limit to growth is 80, initial value is 5 and whose graph also passes through the point (1,20)?

28) Seymour has an ant farm whose population t days after he gets it is found using $P = \frac{1000}{1+49 \cdot 2^{-0.4t}}$

- a) What was the ant farm's initial population?
- b) What is the maximum sustainable population of this ant farm?
- c) On what day will the population be 650 ants?
- d) What will the population be on day 10?