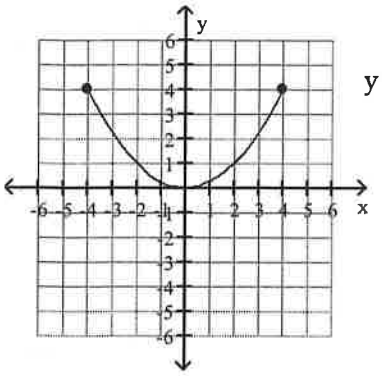
Pre-Calculus Mid Term Review. January 2014

Name_____

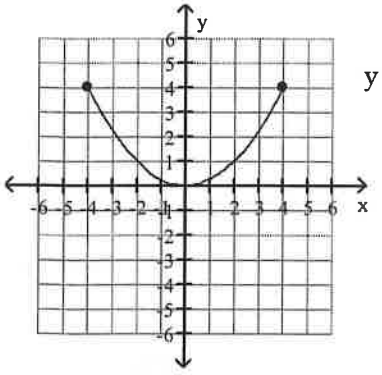
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use the graph of the function f, plotted with a solid line, to sketch the graph of the given function g.

1) $g(x) = f(x + 2) + 2$ 1) _____



2) $g(x) = -f(x - 2) - 2$ 2) _____



Find the domain of the function.

3) $f(x) = \dfrac{x^2}{x^2 + 6}$ 3) _____

4) $h(x) = \dfrac{x - 4}{x^3 - 16x}$ 4) _____

5) $\dfrac{x}{\sqrt{x - 4}}$ 5) _____

Given functions f and g, determine the domain of f + g.

6) $f(x) = 5x + 10, \quad g(x) = \dfrac{2}{x - 9}$ 6) _____

7) $f(x) = \frac{4x}{x-8}$, $g(x) = \frac{5}{x+2}$ 7) _____

Find the domain of the indicated combined function.

8) Find the domain of $\left(\frac{f}{g}\right)(x)$ when $f(x) = 4x^2 - 8x$ and $g(x) = x^2 - 6x - 3$. 8) _____

For the given functions f and g , find the indicated composition.

9) $f(x) = 3x + 7$, $g(x) = 2x - 1$
$(f \circ g)(x)$ 9) _____

10) $f(x) = \frac{4}{x+6}$, $g(x) = \frac{7}{8x}$
$(f \circ g)(x)$ 10) _____

Find the domain of the composite function f ∘ g.

11) $f(x) = 3x + 9$; $g(x) = \sqrt{x}$ 11) _____

12) $f(x) = \frac{6}{x+7}$, $g(x) = x + 2$ 12) _____

Determine which two functions are inverses of each other.

13) $f(x) = \frac{x+8}{4}$ $g(x) = 4x + 8$ $h(x) = \frac{x-4}{8}$ 13) _____

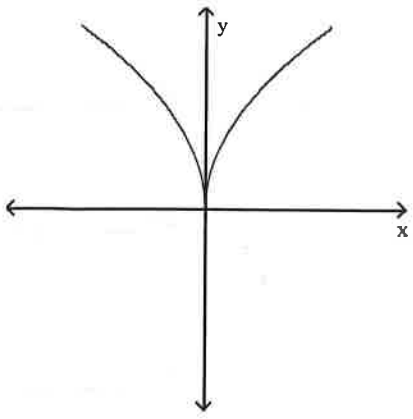
Find the inverse of the one-to-one function.

14) $f(x) = \frac{2x+5}{7}$ 14) _____

15) $f(x) = \frac{5}{7x-8}$ 15) _____

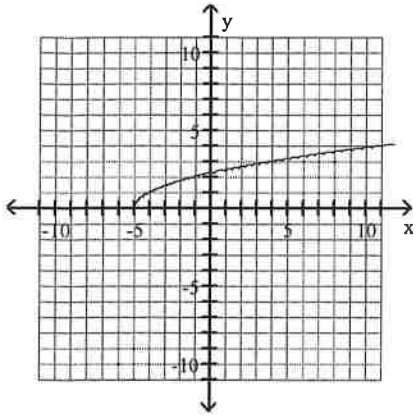
Does the graph represent a function that has an inverse function?

16) 16) _____



Use the graph of f to draw the graph of its inverse function.

17) 17) _____



Find the vertical asymptotes, if any, of the graph of the rational function.

18) $\frac{x - 81}{x^2 - 8x + 15}$ 18) _____

Find the horizontal asymptote, if any, of the graph of the rational function.

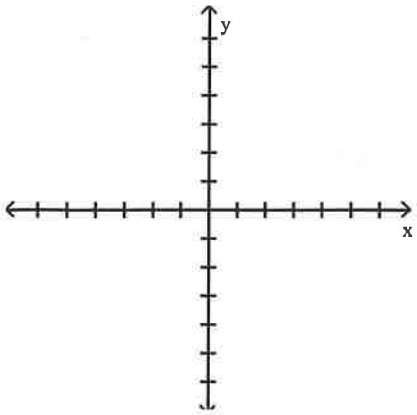
19) $f(x) = \frac{8x}{2x^2 + 1}$ 19) _____

20) $g(x) = \frac{10x^2}{2x^2 + 1}$ 20) _____

21) $h(x) = \frac{10x^3}{5x^2 + 1}$ 21) _____

Graph the rational function.

22) $f(x) = \frac{x^2 - 2x - 3}{x^2 - 1}$ 22) _____



Find the indicated intercept(s) of the graph of the function.

23) x-intercepts of $f(x) = \dfrac{x - 9}{x^2 + 2x - 3}$ 23) _____

24) y-intercept of $f(x) = \dfrac{x^2 - 11x}{x^2 + 7x - 6}$ 24) _____

Find the slant asymptote, if any, of the graph of the rational function.

25) $f(x) = \dfrac{x^2 - 3x + 2}{x + 5}$ 25) _____

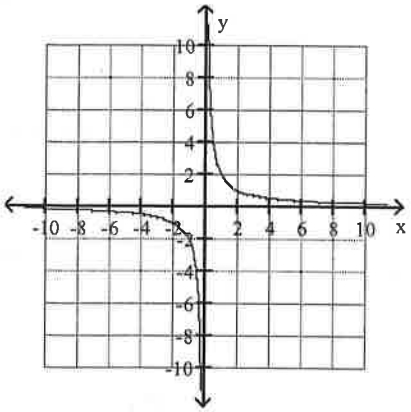
Determine whether the given function is even, odd, or neither.

26) $f(x) = x^3 - 3x$ 26) _____

27) $f(x) = x^3 + x^2 - 4$ 27) _____

Use possible symmetry to determine whether the graph is the graph of an even function, an odd function, or a function that is neither even nor odd.

28) 28) _____



Evaluate the piecewise function at the given value of the independent variable.

29) $f(x) = \begin{cases} x + 3 & \text{if } x > -2 \\ -(x + 3) & \text{if } x \le -2 \end{cases}$; $f(-6)$ 29) _____

Solve the problem.

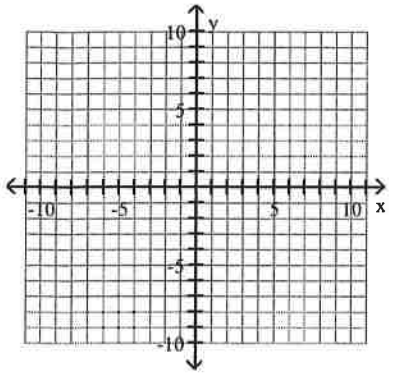
30) Two apartment tenants have a total of 2400 feet of fencing to enclose a rectangular garden and subdivide into two smaller gardens, one for each of them, by placing the fencing parallel to one of the sides. Find the maximum possible area of the enclosed region. 30) _____

Write the standard form of the equation of the circle with the given center and radius.

31) $(-8, 10); \sqrt{19}$ 31) _____

Graph the equation. and state the domain and range.

32) $(x - 6)^2 + (y - 3)^2 = 9$ 32) _____



Write the equation in standard form. Then give the center and radius of the circle.

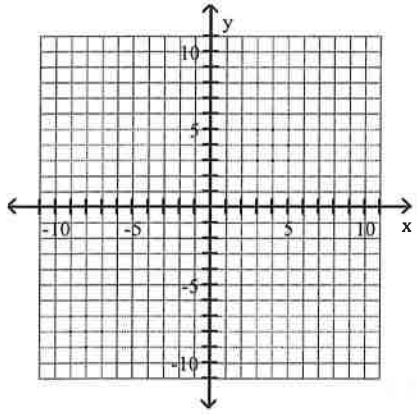
33) $x^2 + y^2 - 10x - 8y + 29 = 0$ 33) _____

Find the standard form of the equation of the ellipse satisfying the given conditions.

34) Endpoints of major axis: (-2, 1) and (-2, 7); endpoints of minor axis: (-4, 4) and (0, 4); 34) _____

Graph the ellipse.

35) $\frac{(x - 1)^2}{16} + \frac{(y + 1)^2}{9} = 1$ 35) _____



Find the foci of the ellipse whose equation is given.

36) $\frac{(x + 2)^2}{9} + \frac{(y - 1)^2}{36} = 1$ 36) _____

Convert the equation to the standard form for an ellipse by completing the square on x and y.

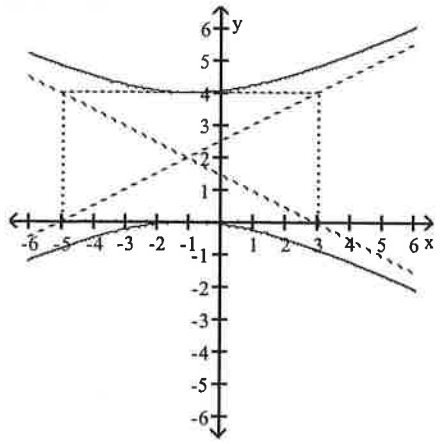
37) $36x^2 + 16y^2 + 72x + 96y - 396 = 0$ 37) _____

Find the standard form of the equation of the hyperbola satisfying the given conditions.

38) Center: (4, 7); Focus: (-3, 7); Vertex: (3, 7) 38) _____

Find the standard form of the equation of the hyperbola.

39)



39) _____

Convert the equation to the standard form for a hyperbola .

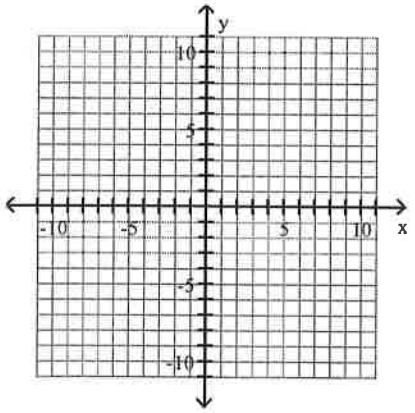
40) $y^2 - 25x^2 + 4y + 50x - 46 = 0$

40) _____

Use the center, vertices, and asymptotes to graph the hyperbola.

41) $\frac{(y+2)^2}{4} - \frac{(x+1)^2}{25} = 1$

41) _____



Find the standard form of the equation of the parabola using the information given.

42) Vertex: (2, -5); Focus: (2, -7)

42) _____

43) Focus: (0, -2); Directrix: x = 6

43) _____

Convert the equation to the standard form for a parabola.

44) $x^2 - 2x + 7y - 34 = 0$

44) _____

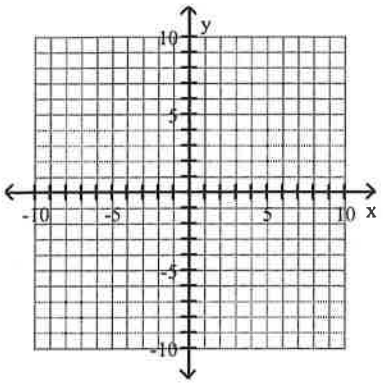
Find the vertex, focus, and directrix of the parabola with the given equation.

45) $(y - 3)^2 = -16(x - 4)$

45) _____

Graph the parabola with the given equation.

46) $(x + 2)^2 = 8(y + 2)$ 46) _____



Solve the problem.

47) An office manager is buying used filing cabinets. Small file cabinets cost \$5 each and large file cabinets cost \$8 each, and the manager cannot spend more than \$59 on file cabinets. A small cabinet takes up 7 square feet of floor space and a large cabinet takes up 10 square feet, and the office has no more than 79 square feet of floor space available for file cabinets. The manager must buy at least 7 file cabinets in order to get free delivery. Let x = the number of small file cabinets bought and y = the number of large file cabinets bought. Write a system of inequalities that describes these constraints. 47) _____

An objective function and a system of linear inequalities representing constraints are given. Graph the system of inequalities representing the constraints. Find the value of the objective function at each corner of the graphed region. Use these values to determine the maximum value of the objective function and the values of x and y for which the maximum occurs.

48) Objective Function $z = 7x + 6y$ 48) _____

Constraints
$x \geq 0$
$y \geq 0$
$3x + y \leq 21$
$x + y \leq 10$
$x + 2y \geq 12$

Find the indicated sum.

49) $\sum_{k=2}^{4} k(k - 10)$ 49) _____

Write a formula for the general term (the nth term) of the arithmetic sequence. Then use the formula for a_n to find a_{20}, the 20th term of the sequence.

50) $-11, -18, -25, -32, \ldots$ 50) _____

Find the indicated sum.

51) Find the sum of the first 20 terms of the arithmetic sequence: $-12, -6, 0, 6, \ldots$ 51) _____

Solve the problem.

52) A brick staircase has a total of 17 steps The bottom step requires 116 bricks. Each successive step requires 5 fewer bricks than the prior one. How many bricks are required to build the staircase? 52) _____

Write a formula for the general term (the nth term) of the geometric sequence.

53) -5, -15, -45, -135, -405, . . . 53) _____

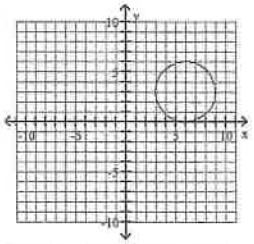
Use the formula for the sum of the first n terms of a geometric sequence to solve.

54) Find the sum of the first 13 terms of the geometric sequence: 7, -14, 28, -56, 112, ... 54) _____

Find the sum of the infinite geometric series, if it exists.

55) $96 + 24 + 6 + \frac{3}{2} + \ldots$ 55) _____

32)



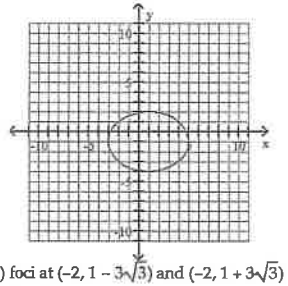
Domain = (3, 9), Range = (0, 6)

33) $(x-5)^2+(y-4)^2=12$

(5, 4), $r=2\sqrt{3}$

34) $\frac{(x+2)^2}{4}+\frac{(y-4)^2}{9}=1$

35)



36) foci at $(-2, 1-3\sqrt{3})$ and $(-2, 1+3\sqrt{3})$

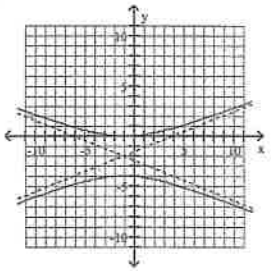
37) $\frac{(x+1)^2}{16}+\frac{(y+3)^2}{36}=1$

38) $(x-4)^2-\frac{(y-7)^2}{48}=1$

39) $\frac{(y-2)^2}{4}-\frac{(x+1)^2}{16}=1$

40) $\frac{(y+2)^2}{25}-(x-1)^2=1$

41)



42) $(x-2)^2=-8(y+5)$

43) $(y+2)^2=-12(x-3)$

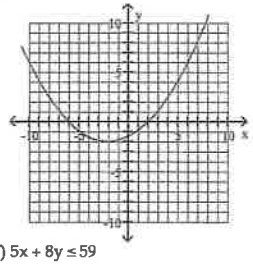
44) $(x-1)^2=-7(y-5)$

45) vertex: (4, 3)

focus: (0, 3)

directrix: $x=8$

46)



47) $5x+8y\le 59$

$7x+10y\le 79$

$x+y\ge 7$

48) Maximum 65.5; at (5.5, 4.5)

49) −61

50) $a_n=-7n-4$; $a_{20}=-144$

51) 900

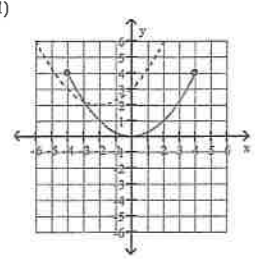
52) 1292 bricks

53) $a_n=-5(3)^{n-1}$

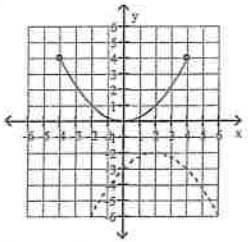
54) 19,117

55) 128

1)

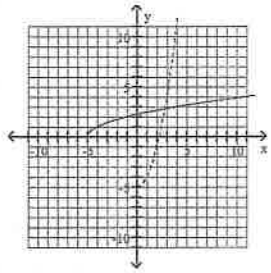


2)

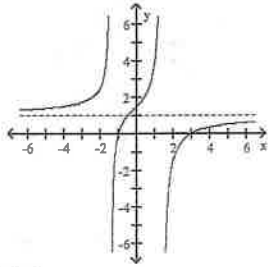


3) $(-\infty, \infty)$
4) $(-\infty, -4) \cup (-4, 0) \cup (0, 4) \cup (4, \infty)$
5) $(4, \infty)$
6) $(-\infty, 9)$ or $(9, \infty)$
7) $(-\infty, -2)$ or $(-2, 8)$ or $(8, \infty)$
8) Domain: $\left(-\infty, 3-2\sqrt{3}\right) \cup \left(3-2\sqrt{3}, 3+2\sqrt{3}\right) \cup \left(3+2\sqrt{3}, \infty\right)$
9) $6x + 4$
10) $\frac{32x}{7+48x}$
11) $[0, \infty)$
12) $(-\infty, -9)$ or $(-9, \infty)$
13) None
14) $f^{-1}(x) = \frac{7x-5}{2}$
15) $f^{-1}(x) = \frac{5}{7x} + \frac{8}{7}$
16) No

17)



18) $x = 5, x = 3$
19) $y = 0$
20) $y = 5$
21) no horizontal asymptote
22)



23) (9, 0)
24) (0, 0)
25) $y = x - 8$
26) Odd
27) Neither
28) Odd
29) 3
30) $A(x) = x\left(\frac{2400-3x}{2}\right)$ MAX = 240,000 ft^2
31) $(x+8)^2 + (y-10)^2 = 19$