In Problems 1-6, determine the ***domain*** *for each function*. Show some work. *Write your answers in interval notation.*

1. $f(x) = x^2 - 4$ 1. _____ (2pts.)

2. $f(x) = \sqrt{4 - \frac{1}{2}x}$ 2. _____ (4pts.)

3. $f(x) = \frac{5x}{x^2 - 4x - 12}$ 3. _____ (4pts.)

4. $f(x) = \log_4\left(\frac{1}{5} - 2x\right)$ 4. _____ (4pts.)

5. $f(x) = 2^{x-5}$ 5. _____ (2pts.)

6. $f(x) = \frac{2x + 5}{4x^2 + 25}$ 6. _____ (2pts.)

Name:_____

7. *Let* $f(x) = -x^2 + 3$, $g(x) = \dfrac{x}{x-2}$ *and* $h(x) = \dfrac{2}{x+1}$. *Find the given new functions, simplify your answers.*

a) $(g \circ h)(x)$ 7a. _____(5pts.)

b) $g^{-1}(x)$ 7b. _____(6pts.)

c) $f(g(-4))$ 7c. _____(3pts.)

8. *One number, n, is 6 less than the quarter of the second number, m. Find the numbers for which the <u>product</u> is a minimum. Then, find the minimum product.*

a) *Write the equation of the function describing the product and then, find the numbers.*

8a. _P(n) =_____(6pts.)

b) *Find the minimum product.* 8b. _____(2pts.)

Name:_____

Expressions

In Problems 9-13, simplify each expression. Assume that the variables represent any real numbers.

9. $\sqrt{16x^{10}y^9z^5} \times \sqrt{8x^{-4}y^{-2}z}$ 9. _____(5pts.)

10. $\dfrac{\sqrt[3]{625x^{10}y^9z^{10}}}{\sqrt[3]{5x^4y^2z^{-3}}}$ 10. _____(5pts.)

11. $(-64)^{-\frac{2}{3}}$ 11. _____(3pts.)

12. $\dfrac{2xyz}{\sqrt[4]{4x^2y^3z}}$ 12. _____(5pts.)

13. $\sqrt{50x^4} - \sqrt{18x^4} + 2x^2\sqrt{27x} - \sqrt{75x^5}$ 13. _____(6pts.)

Name:_____

14. *Perform the indicated operations and write the answers in the form* $a+bi$.

a) $\dfrac{-5+i}{5+i}$ 14a. _____(4pts.)

b) $\left(\dfrac{1}{2}-\sqrt{-16}\right)\left(-4+\sqrt{-36}\right)$

14b._____(4pts.)

15. *Evaluate the exact value of each expression*.

a) $\log_{16} 64$ 15a. _____(2pts.)

b) $10^{\log 4-\log 1/2}$ 15b. _____(2pts.)

c) $\ln(e)^{x^2+1}$ 15c. _____(2pts.)

16. *Write the logarithmic expression as the sum or the difference of logarithms.*

$\ln\left(\dfrac{e^{2x}x^4y^6}{\sqrt[4]{z}}\right)^{1/2}$ 16. _____(4pts.)

17. *Write the expression as a single logarithm with coefficient 1. Simplify if possible.*

$12\log\sqrt[4]{x}+6\log\sqrt{x}-6\log x$ 17. _____(4pts.)

Name:_____

Equations and System of Equations

18. *Solve for x*: $2-|2x-10|=-8$ (interval notation) 18. _____(7pts.)

19. *Solve for x:* $\sqrt{x+1}+5=x$ 19. _____(7pts.)

20. Solve by the quadratic formula. Complex numbers as solutions are allowed.

$2x^2-6x+5=0$

20. _____(7pts.)

Name:_____

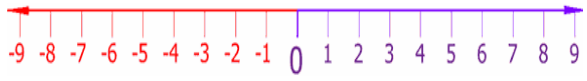
21. *Solve for x:* $3^{x+1}\ 3^{x} = \dfrac{1}{27}$ 21. _____(7pts.)

22. *Solve for x:* $\log_4 x + \log_4 (x+6) = 2$ 22. _____(7pts.)

Inequalities

In Problems 25-28, solve each inequality. Write the solution set using interval notation and graph it.

23. $\dfrac{2}{3}x - 2 < -4$ or $2 - \dfrac{1}{2}x \le -1$ 23. _____(6pts.)



24. $3 - 2|2x - 1| \ge -9$ 24. _____(7pts.)

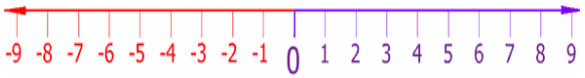
Name:_____

25. $x^2 + 8x \leq -15$

25. _____(7pts.)

26. $\frac{4x-7}{x-4} \geq 3$

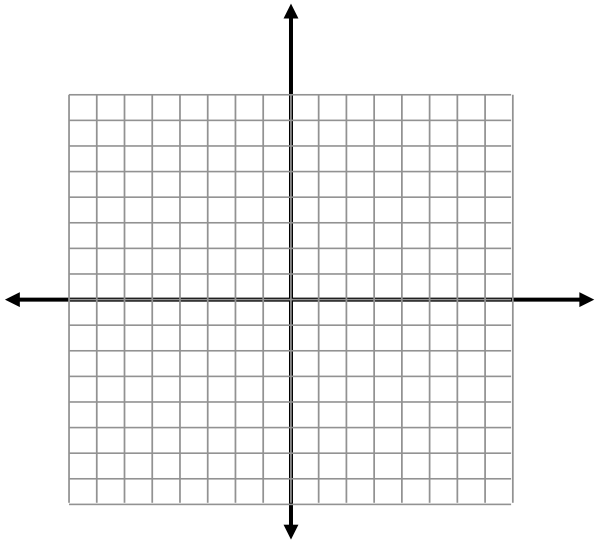
26. _____(7pts.)



Name:_____

Graphing

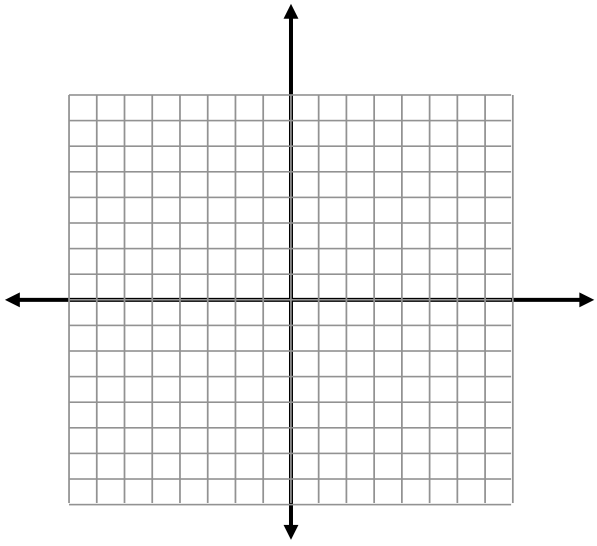
27. *Graph* $f(x) = -\sqrt{x+3} + 4$. *Give the domain and range of the function.* (7pts.)



Domain: _____

Range: _____

28. *Graph* $f(x) = -4 + |x+2|$. *Give the domain and range of the function.* (7pts.)

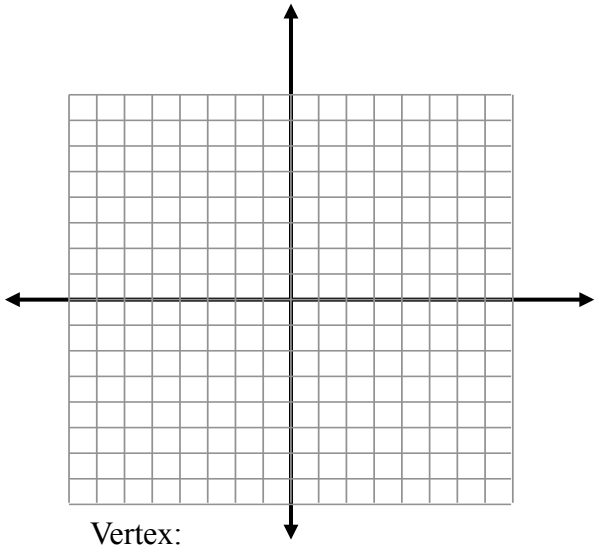


Domain:_____

Range: _____

Name:_____

29. *Graph* $f(x) = x^2 + 6x + 10$. *Give the vertex, x-and y-intercepts, domain and range of the function.* (10pts.)



Vertex: _____

x-intercept(s):_____

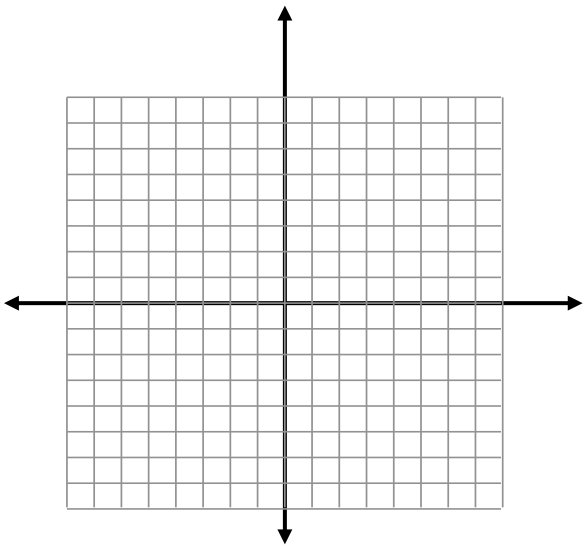
y-intercept:_____

Domain: _____

Range: _____

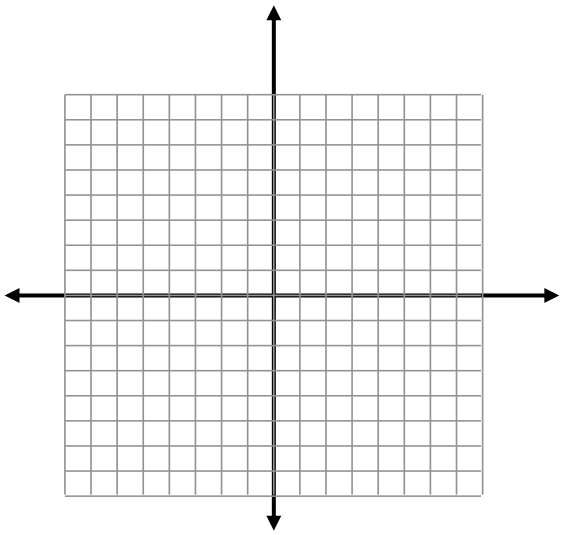
30. Graph the circle. *(6 pts.)*

$2x^2 - 12x + 2y^2 - 4y + 12 = 0$

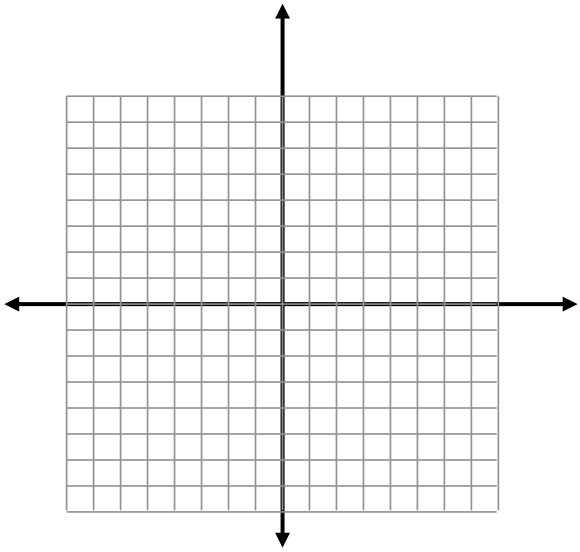


Name:_____

31. Graph the ellipse $-9x^2 - 4y^2 = -36$. (5pts.)

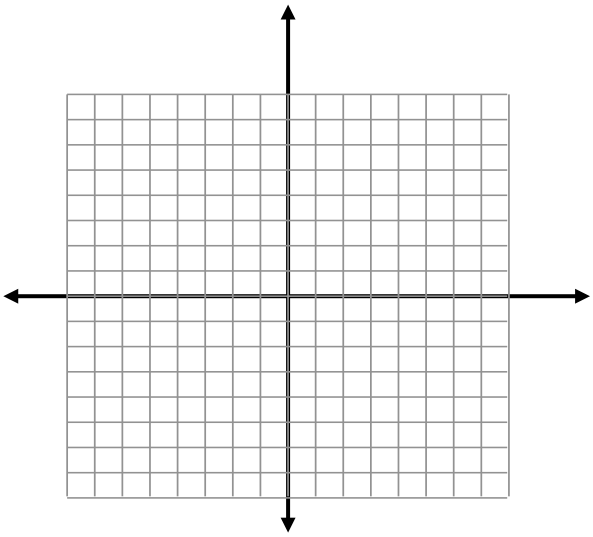


32. *Graph the hyperbola* $16x^2 - 9y^2 = -144$. *Write the slopes of the asymptotes.* (6pts.)



Name:_____

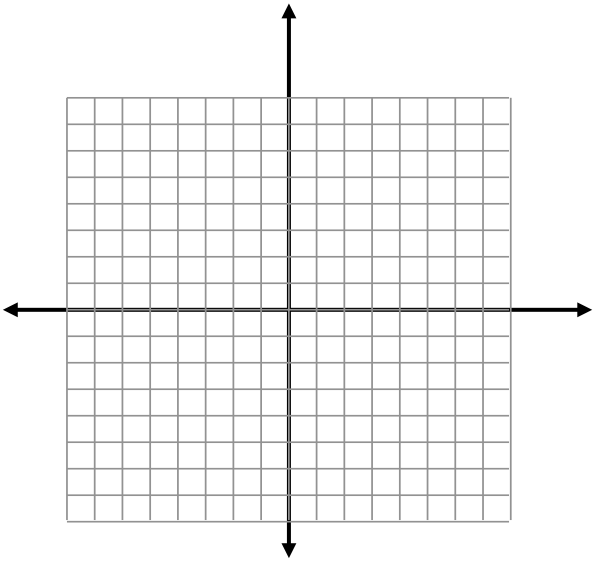
33. *Graph* $f(x) = \left(\frac{1}{4}\right)^x - 2$. *Give the domain & range of the function. Write the eqn of the asymptote.*(7pts.)



Domain:_____

Range: _____

34. *Graph* $g(x) = \log_3 x$. *Give the domain and range of the function. Write the eqn of the asymptote.* (7pts.)



Domain: _____

Range: _____

Name:_____

Sequences

35.*Write a formula for the nth term of the sequence.*

$-1,\frac{1}{2},-\frac{1}{4},\frac{1}{8},-\frac{1}{16},...$ 35. _____(4pts.)

36.*Express the sum using summation notation.* {Hint: $1 = 3^0$ }

$-1+3-9+27-81+243-729$ 36. _____(4pts.)

37.*Find the first four terms of the given sequence.* $a_n = (-1)^n \frac{n!}{(n-1)!}$ 37._____(4pts.)