King School
MAT 405: Functions and Trigonometry
Summer Assignment

NAME _____

Directions:

- Answer each of the following questions to the best of your ability. Make sure to show work to support **each** answer and circle your final answer for each question.
- Work neatly and try to show all of your work on the packet itself.
- You will be quizzed on this material during the second week of school so please take your time and try your best.
- You may use the Internet to look up a topic, but you cannot use the internet to get the answer to a specific question.

Simplify each expression:

1. $7 + (9 - 3 \cdot 4)^2$

2. $\frac{\frac{2}{3}+\frac{1}{5}}{\frac{1}{2}}$

3. $\left(\frac{x^2+2x-3}{x+2}\right) \cdot \left(\frac{x^2+2x}{x^2-1}\right)$

4. $(7x - 2y)(3x + 5y)$

5. $(2y^3 + 2y^2 - y + 16) - (5y^3 + 3y - 3)$

6. $\frac{6x^4+27x^5+3x^2+3x}{3x^2}$

7. $3x^2(7x + 5) - 3x^2 - 2(x^3 - x)$

8. $(2x^2 - 3x) + (3x + 2) - 2(3x^2 - 2x)$

Factor each of the following as much as possible.

9. $7x^2 + 4x - 21$

10. $8x^2y^5 - 30x^3y^4 + 3xy^3$

11. $2x^2 - 5x - 12$

12. $8x^3y^5 - 12x^4y^2$

13. $3x^2 - 8x + 4$

14. $10x^2 - 19x + 6$

15. $x^3 - 3x^2 - 2x + 6$

16. $x^5 - 7x^3 - 18x$

Solve each equation for x.

17. $\frac{2x+1}{5} = \frac{3x+1}{2}$

18. $\frac{x}{2} + \frac{5x}{6} = \frac{2x}{3} + \frac{1}{12}$

19. $3(x-8) + 4x = 5x - (x+7)$

20. $8x^2 - 6x - 5 = 0$

21. $11x^2 - 14x + 32 = 48$

22. $2x^2 + 4x + 11 = 8x + 12$

23. $-2x^2 - 2x + 3 = 4(x^2 - 2x)$

24. $\sqrt{x} = 3x - 1$

25. $\frac{3}{2x} - \frac{9}{2} = 6x$

26. $\frac{2}{3x} + \frac{2}{3} = \frac{8}{x+6}$

27. $\frac{2}{x+1} + \frac{x}{x-1} = \frac{2}{x^2-1}$

28. $\sqrt{15 - 2x} = 0$

29. $3|2x - 5| + 7 = 14$

30. Match the following equations to their descriptions.

a. $a(x) = \frac{2}{3}|4x + 5| - 3$

b. $b(x) = \frac{2}{3} \cdot \sqrt[3]{4x + 5} - 3$

c. $c(x) = \frac{2}{3} \cdot \frac{1}{4x+5} - 3$

d. $d(x) = \frac{2}{3}(4x + 5)^4 - 3(4x + 5)^2 - 2$

e. $e(x) = \frac{2}{3}(4x + 5)^3 - 3$

f. $f(x) = \frac{2}{3}(4x + 5) - 3$

g. $g(x) = \frac{2}{3}(4x + 5)^2 - 3$

h. $h(x) = \frac{2}{3}\sqrt{4x + 5} - 3$

Linear Function

Quadratic Function

Absolute Value Function

Cubic Function

Cube Root Function

Square Root Function

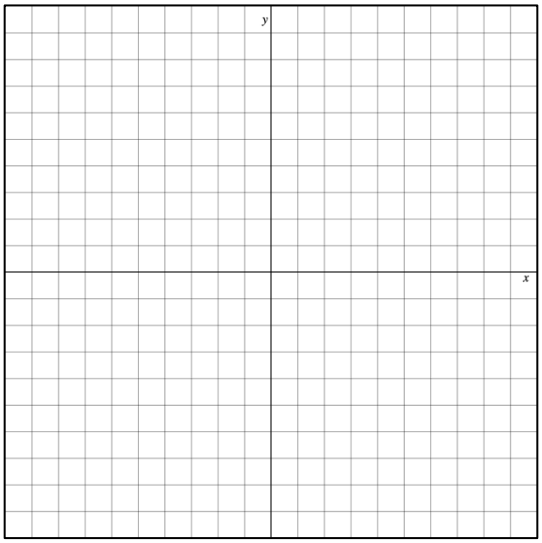
Rational Function

Polynomial Function

Describe the domain and range of each function above using interval notation:

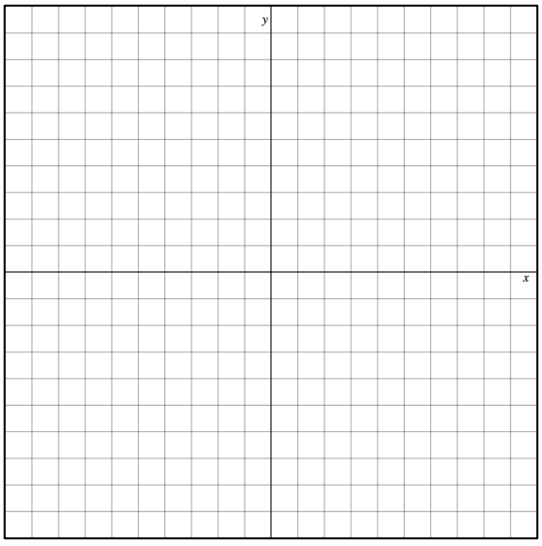
Function	Domain	Range
$a(x)$		
$b(x)$		
$c(x)$		
$d(x)$		
$e(x)$		
$f(x)$		
$g(x)$		
$h(x)$		

31. Write the equation of the line, in slope-intercept form, that goes through the points $(-2, 3)$ and $(9, -8)$. Graph the line on the coordinate plane.

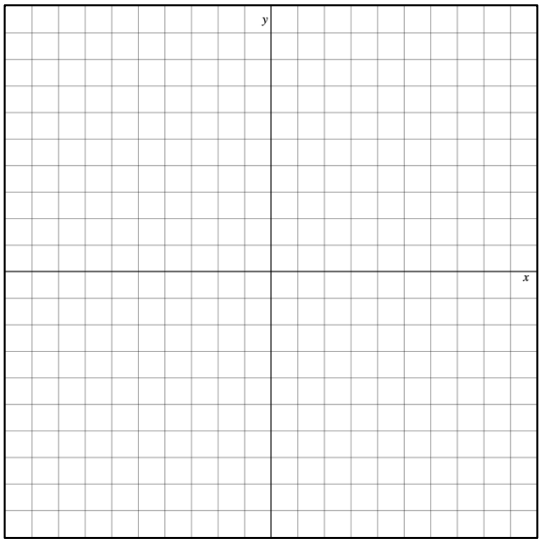


32. Write the equation of the line, in slope-intercept form, that goes through the points $(5, -7)$ and $(-9, 12)$. Then, write the equation of the line parallel to the equation you wrote that goes through the point $(-3, -4)$.

    Graph the lines on the coordinate plane.



33. Write the equation of the line, in slope-intercept form, that goes through the points $(-12, 6)$ and $(-20, 14)$. Then, write the equation of the line perpendicular to the equation you wrote that goes through the point $(-3, -4)$.
Graph the lines on the coordinate plane.



34. Simplify each of the following:

a. $\sqrt{125}$

b. $-3\sqrt{48} + 6\sqrt{3}$

c. $(3i)^2$

d. $(3-4i)(5+6i)$

e. $(2-5i)+2(7i-3)-4i(10-2i)$

f. $\frac{2+i}{3-7i}$

g. $\sqrt{-9}+\sqrt{-200}$

35. Suppose (3, -4) is a point on the graph of $f(x)$. For each of the following, describe the transformation on the graph of $f(x)$ and the new point it creates.

	Transformation	**New Point**
a)	$y = f(x + 2)$	
b)	$y = f(x) + 5$	
c)	$y = ½\, f(x)$	
d)	$y = f(-x)$	
e)	$y = f(x - 7)$	
f)	$y = 4f(x)$	
g)	$y = -f(x)$	

36. Write the equation of the line, in slope-intercept form, that is perpendicular to the line $2x - 3y = 15$ and that passes through the point $(-4, -10)$.

37. Simplify each of the following.

a. $\sqrt[3]{27x^3y^6}$

b. $\sqrt{16x^5}$

38. Simplify each of the following expressions. Write your final answers with positive exponents only.

a. x^2x^6

b. $6(x^4y^5)(7x^5y)$

c. $\frac{x^7}{x^2}$

d. $\frac{30x^9y^5}{-6x^2y}$

e. $\frac{x^{-5}y^3m^2}{x^2y^{-8}m^6}$

f. $(x^{-2})^3$

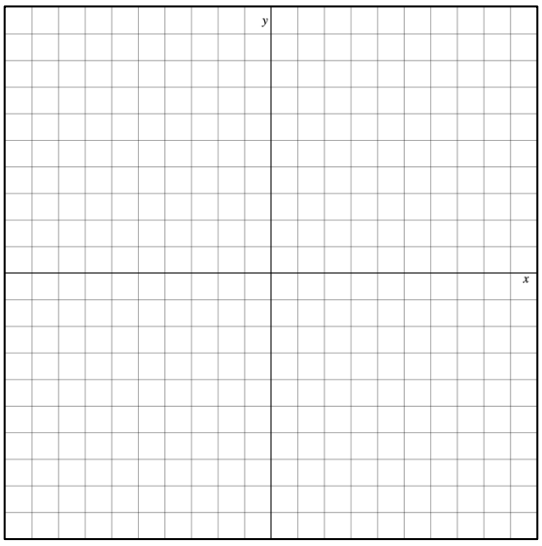
g. $(-2x^5y)^3$

h. $\left(\frac{6xy^6}{3y^4x^{-2}}\right)^4$

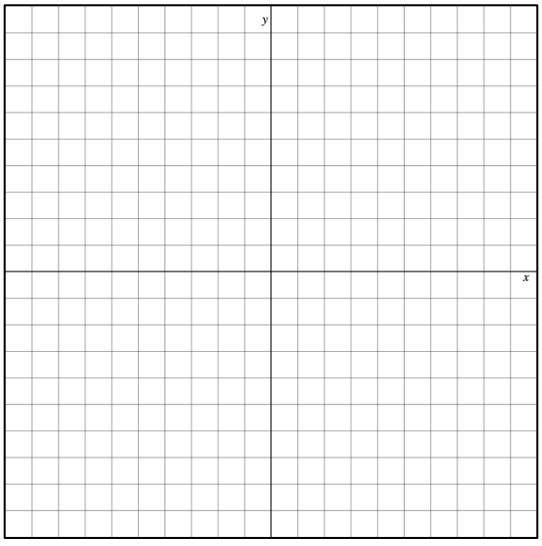
i. $\left(\frac{2x}{m^3}\right)^{-2}$

39. Solve each of the following systems for x and y. Then graph the system and indicate the solution on the graph.

a. $\begin{cases} 2x - y = 14 \\ 5x + y = 63 \end{cases}$



b. $\begin{cases} -\frac{3}{5}x + \frac{6}{5} = y - 5 \\ -x + 1 = -\frac{2}{7}y - \frac{38}{7} \end{cases}$



40. Divide: $\frac{x^2+6x+8}{x^2+3x} \div \frac{x^2+x-2}{4x^2+12x}$

41. Multiply: $\frac{x^2+6x+8}{x^2-4x+3} \cdot \frac{x^2-5x+4}{5x+10}$

42. Add: $\frac{4}{x^2+5x+6} + \frac{2x}{x+2}$

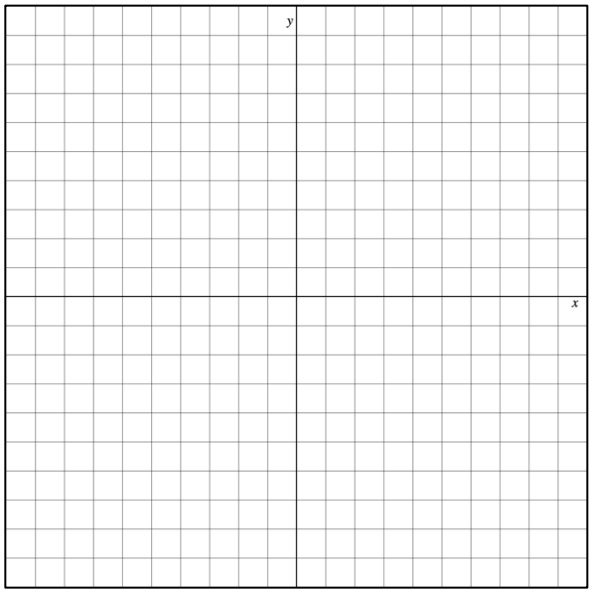
43. Subtract: $\frac{3}{x-1} - \frac{2}{x-2}$

44. Given the equation $\frac{2}{3}x - 9y = -18$, answer each of the following:

a. Write the equation in slope-intercept form.

b. Identify the slope and y-intercept of the function.

c. Graph the function on the coordinate plane below.



45. If $f(x) = 3x^2 - 7x + 1$, evaluate each of the following. Leave answers as simplified fractions, if necessary.

a. $f(-2)$

c. $f\left(\frac{1}{2}\right)$

b. $f(3)$

d. $f(4a)$

46. Given the function $y = x^2 - 4x - 12$, answer each of the following:

a. What is the name of the shape this function creates when it is graphed?

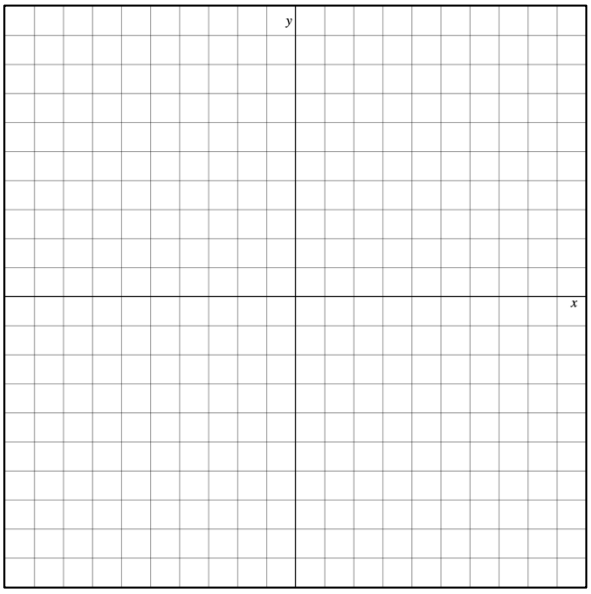
b. Does the graph of this function open up or down?

c. Find the vertex of the function.

d. Find the y-intercept of the function.

e. Find the x-intercept(s) of the function.

f. Graph the function on the coordinate plane below.



47. Solve each by taking square roots. Leave answers as simplified radicals or fractions, if necessary.

a. $4x^2 = 25$

b. $3(x + 4)^2 = 8$

48. Evaluate each logarithmic expression.

a. $\log 100$

b. $\log_2 16$

c. $\log_3 \sqrt{3}$

d. $\log_6 216$

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

49. Simplify each expression completely.

a. $\frac{8z^3-1}{2z^2+5z-3}$

b. $\frac{y^3+2y^2+4y}{y^3+2y^2} \cdot \frac{y^2-4}{y^3-8}$

c. $\frac{7x-7y}{4y} \div \frac{14x-14y}{3y}$

d. $\frac{5}{x^2+x-6} - \frac{2}{x-2} + \frac{4}{x^2-4}$