Pre-Calculus Review for Chapter 1 Name: Key

1. Find the equation of the line that:

   a. passes through the point (8, 5) with a slope of $m = \frac{3}{2}$

   $y - 5 = \frac{3}{2}(x - 8)$

   $y - 5 = \frac{3}{2}x - 12$
   $+5 \qquad +5$

   $\boxed{y = \frac{3}{2}x - 7}$

   b. passes through the point (-2, 3) with a slope of $m = \frac{1}{2}$

   $y - 3 = \frac{1}{2}(x + 2)$

   $y - 3 = \frac{1}{2}x + 1$
   $+3 \qquad +3$

   $\boxed{y = \frac{1}{2}x + 4}$

   c. passes through the point (9, 2) with an undefined slope.

   $\boxed{x = 9}$

   d. passes through the point (3, 6) with a slope of 0.

   $\boxed{y = 6}$

   e. passes through the point (10, 5) that is perpendicular to the line $3x + 5y = 5$.

   $\frac{5y}{5} = \frac{-3x + 5}{5}$

   $m = -\frac{3}{5}$

   $m_\perp = \frac{5}{3}$

   $y - 5 = \frac{5}{3}(x - 10)$

   $y - 5 = \frac{5}{3}x - \frac{50}{3} + \frac{15}{3}$
   $+5$

   $\boxed{y = \frac{5}{3}x - \frac{35}{3}}$

   f. passes through the point (-8, 3) that is parallel to the line $-2x + 4y = 5$.

   $\frac{4y}{4} = \frac{2x + 5}{4}$

   $y = \frac{2}{4}x + \frac{5}{4}$

   $m = \frac{1}{2}$

   $y - 3 = \frac{1}{2}(x + 8)$

   $y - 3 = \frac{1}{2}x + 4$
   $+3 \qquad +3$

   $\boxed{y = \frac{1}{2}x + 7}$

2. During the 1st and 2nd years, a business had sales of \$46,000 and \$61,000 respectively. The growth of sales follows a linear pattern. Use this information to find sales during the 3rd year.

   $m = \frac{61000 - 46000}{2 - 1} = \frac{15000}{1}$ $\qquad 61000 + 15000 = \boxed{\$76{,}000}$

3. For the function $f(x) = \frac{6}{2x+7}$, evaluate

   a. $f(2) = \frac{6}{2(2)+7}$ $\boxed{\frac{6}{11}}$

   b. $f(-3) = \frac{6}{1}$ $= \boxed{6}$

   c. $f(1) = \frac{6}{9} = \boxed{\frac{2}{3}}$

   d. $f(-2) = \frac{6}{3}$ $\boxed{2}$

4. For the function $h(x) = \sqrt{9 - x}$, evaluate

   a. $h(0) = \sqrt{9-0}$ $= \boxed{3}$

   b. $h(9) = \boxed{0}$

   c. $h(5) = \boxed{2}$

   d $h(-7) = \boxed{4}$

5. Find the domain of the following functions:

a. $g(x)=\dfrac{7x+1}{2x-8}$

$2x-8\neq 0$

$2x=8$

$\boxed{\mathbb{R},\ x\neq 4}$

b. $m(x)=\sqrt{3x+9}$

$3x+9\geq 0$

$3x\geq 9$

$\boxed{\mathbb{R},\ x\geq 3}$

c. $f(x)=\dfrac{2x+2}{x^2-25}$

$x^2-25\neq 0$

$\sqrt{x^2}\neq\sqrt{25}$

$\boxed{\mathbb{R},\ x\neq \pm 5}$

d. $h(x)=\sqrt{9-3x}$

$9-3x\geq 0$

$+3x \quad +3x$

$\frac{9}{3}\geq\frac{3x}{3}$

$3\geq x$

$\boxed{\mathbb{R},\ x\leq 3}$

6. Given $f(x) = 3x + 5$, simplify: $\dfrac{f(x+m)-f(x)}{m}$ $\quad m\neq 0$

$\dfrac{3(x+m)+5-(3x+5)}{m}$

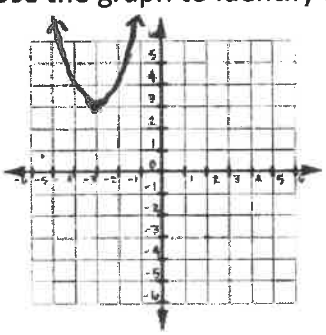
$\dfrac{3x+3m+5-3x-5}{m}=\dfrac{3m}{m}=\boxed{3}$

7. Given $f(x) = 2x^2 + 8x - 15$, simplify: $\dfrac{f(x-h)+f(x)}{h}$ $\quad h\neq 0$

$\dfrac{2(x-h)^2+8(x-h)-15+2x^2+8x-15}{h}=\dfrac{2(x^2-2xh+h^2)+8x-8h-15+2x^2+8x-15}{h}=$

$\dfrac{2x^2-4xh+2h^2+16x-8h-30+2x^2}{h}=\boxed{\dfrac{4x^2-4xh+2h^2+16x-8h}{h}}$

8. Use the graph to identify the parent function, transformations, and write an equation.

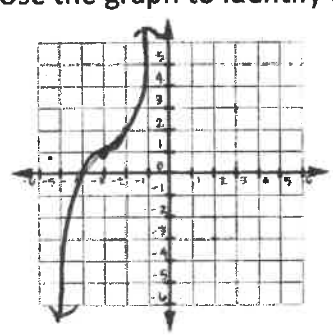


parent function = x^2

transformations shift up 3, shift left 3

equation = $(x+3)^2+3$

9. Use the graph to identify the parent function, transformations, and write an equation.



parent function = x^3

transformations shift left 3, shift up 1

equation = $(x+3)^3+1$

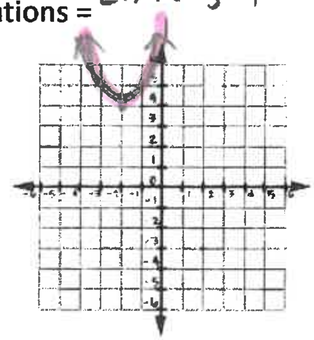
10. Identify the parent function, describe the transformations, and graph the function

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

parent function = x^2

transformations = Left 2 ; up 4

graph:

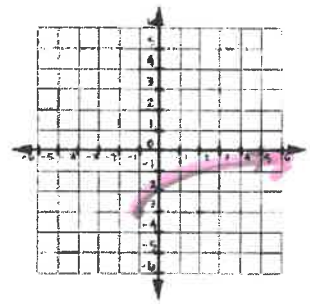


b. *f(x)=* $\sqrt{x+1} - 3$

parent function = $\sqrt{x}$

transformations = shift Left 1 , down 3

graph:

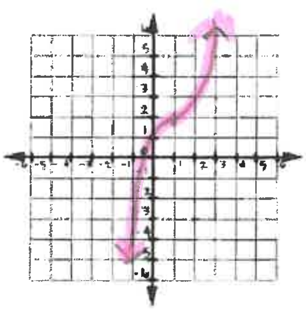


c. f(x)= $(x - 1)^3 + 2$

parent function = x^3

transformations = right 1 , up 2

graph:

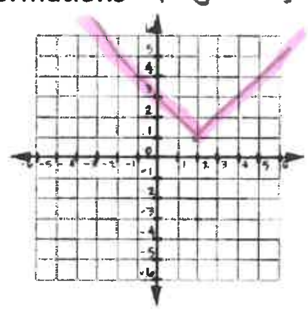


d. *f(x)=* $|x - 2| + 1$

parent function = $|x|$

transformations = right 2, up 1

graph:



11. Let *f(x)* = 4x – 5 and *g(x)* = $2x^2 + 4$, Find:

a. *(f+g)(x)* = $\boxed{2x^2+4x-1}$

b. *(fg)(x)* =

$(4x-5)(2x^2+4)$

$8x^3+16x-10x^2-20$

$\boxed{8x^3-10x^2+16x-20}$

c. *(f - g)(x)*=

$(4x-5)-(2x^2+4)$

$\boxed{-2x^2+4x-9}$

d. *f(g(x))* =

$4(2x^2+4)-5$

$8x^2+16-5$

$\boxed{8x^2+11}$

e. *g(f(x))* =

$2(4x-5)^2+4$

$2(16x^2-40x+25)+4$

$\boxed{32x^2-80x+54}$

f. *f(g(3))*=

$g(3)=2\cdot 9+4=22$

$f(22)=4(22)-5$

$=88-5$

$\boxed{83}$

12. <u>Show</u> that $f(x) = 3 - 5x$ and $g(x) = \frac{3-x}{5}$ are inverses algebraically. (show that f(g(x)) and g(f(x)) = x

$f(g(x)) = 3 - 5\left(\frac{3-x}{5}\right)$
$= 3 - (3 - x)$
$= 3 - 3 + x$
$= x$

$g(f(x)) = \frac{3 - (3 - 5x)}{5}$
$= \frac{3 - 3 + 5x}{5} = \frac{5x}{5} = x$

13. Find the inverse function algebraically for:

a. $f(x) = 2x - 5$

$x = 2y - 5$
$\frac{x+5}{2} = \frac{2y}{2}$
$\frac{x+5}{2} = y$ $\boxed{f^{-1}(x) = \frac{x+5}{2}}$

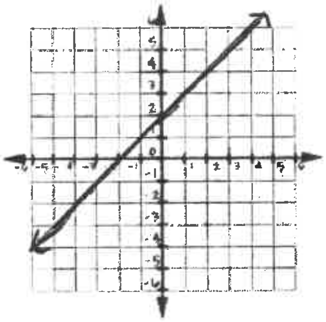
b. $f(x) = \sqrt{x+16}$

$x = \sqrt{y+16}$
$x^2 = y + 16$
$-16 \quad -16$
$x^2 - 16 = y$ $\boxed{f^{-1}(x) = x^2 - 16}$

c. $f(x) = x^3 + 5$

$x = y^3 + 5$
$\sqrt[3]{x-5} = \sqrt[3]{y^3}$
$\sqrt[3]{x-5} = y$
$\boxed{f^{-1}(x) = \sqrt[3]{x-5}}$

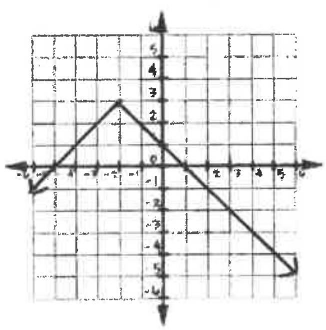
14. Use the graph to answer the questions:



a. Is it a function? Yes

b. Does it have an inverse? yes

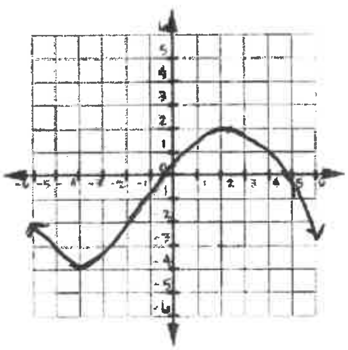
15. Use the graph to answer the questions:



a. Is it a function? Yes

b. Does it have an inverse? NO

16. Use the graph to answer the following:



a. Identify the relative maximum: y= 2

b. Identify the relative minimum: y= -4

17. Evaluate $f(x) = \begin{cases} 2x + 8 & x \le 1 \\ x^2 + 7 & x > 1 \end{cases}$

a. f(3)

$3^2+7 = \boxed{16}$

b. f(-2)

$2(-2)+8$

$\boxed{4}$

c. f(1)

$2(1)+8 = \boxed{10}$

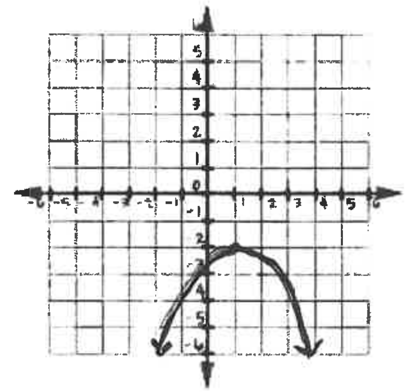
18. Identify:

Domain $\mathbb{R}$

Range $\mathbb{R}, y \le -2$

Where increasing $x < 1$

Where decreasing $x > 1$



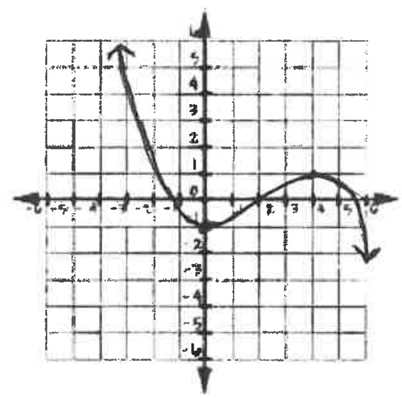
19. Identify:

Domain $\mathbb{R}$

Range $\mathbb{R}$

Where increasing $0 < x < 4$

Where decreasing $x < 0$; $x > 4$



20. Identify:

Domain $\mathbb{R}$

Range $\mathbb{R}$; $y \ge -3$

Where increasing $-3 < x < 0$; $x > 4$

Where decreasing $x < -3$; $0 < x < 4$