$x^2+2x+3=0$
$x^2+2x+1=-3+1$
$(x+1)^2=-2$
$(x+1)^2+2=0$ $V(-1,2)$

Name: key

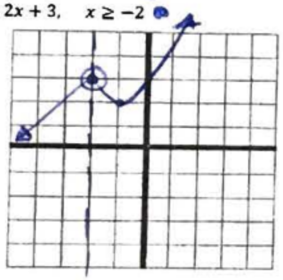
Pre-Calculus

Review Section 1.1 part 3 and 4

Part I. Carefully graph each of the following, then evaluate

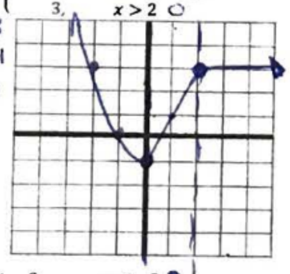
1. $h(x)=\begin{cases} x+5, & x<-2 \\ x^2+2x+3, & x\geq -2 \end{cases}$

$h(3)=18$
$h(-4)=1$
$h(-2)=3$



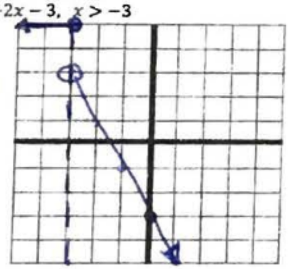
3. $g(x)=\begin{cases} x^2-1, & x\leq 0 \\ 2x-1, & 0<x\leq 2 \\ 3, & x>2 \end{cases}$

$g(-2)=3$
$g(0)=-1$
$g(5)=3$



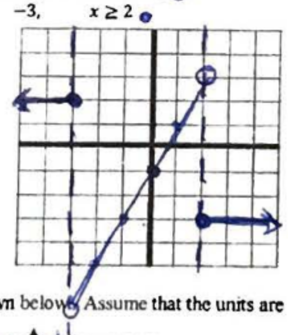
2. $m(x)=\begin{cases} 5, & x\leq -3 \\ -2x-3, & x>-3 \end{cases}$

$m(-4)=5$
$m(0)=-3$
$m(3)=-9$



4. $p(x)=\begin{cases} 2, & x\leq -3 \\ 2x-1, & -3<x<2 \\ -3, & x\geq 2 \end{cases}$

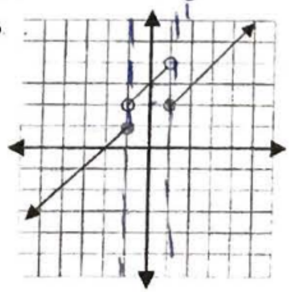
$p(0)=$
$p(-3)=$
$p(2)=$



Part II. Write equations for the piecewise functions whose graphs are shown below. Assume that the units are 1 for every tick mark.

5.

6.



$f(x)=\begin{cases} x+5, & x<-2 \\ -2, & x\geq -2 \end{cases}$

$f(x)=\begin{cases} x+2, & x\leq -1 \\ x+3, & -1<x<1 \\ x+1, & x\geq 1 \end{cases}$

Part III: Write the ***set*** and ***interval*** notation for the domain of each function.

7. $f(x)=x+5$

$D: \{x\in\mathbb{R}\}$, $D: (-\infty,\infty)$

8. $f(x)=\frac{1}{2x+5}$

$2x+5\neq 0$
$2x\neq -5$
$x\neq -5/2$

$D: \{x\in\mathbb{R} \mid x\neq -5/2\}$, $D: (-\infty,-\frac{5}{2})\cup(\frac{-5}{2},\infty)$

9. $f(x)=\sqrt{x+4}$

$x+4\geq 0$
$x\geq -4$

$D: \{x\in\mathbb{R} \mid x\geq -4\}$, $D: [-4,\infty)$

10. $f(x)=\frac{1}{\sqrt{x+3}}$

$x+3>0$
$-3\ \ -3$
$x>-3$

$D: \{x\in\mathbb{R} \mid x>-3\}$, $D: (-3,\infty)$

11. $f(x)=\frac{\sqrt{x-2}}{x}$

$x-2\geq 0$
$x\geq 2$

$\cancel{x\neq 0}$ Don't need

$D: \{x\in\mathbb{R} \mid x\geq 2\}$, $D: [2,\infty)$

12. Write the interval notation of this domain in set notation.

a. $(-\infty,8)\cup(12,\infty)$

Set Notations: $\{x\in\mathbb{R} \mid x<8, x>12\}$

b. $(-3,1]$

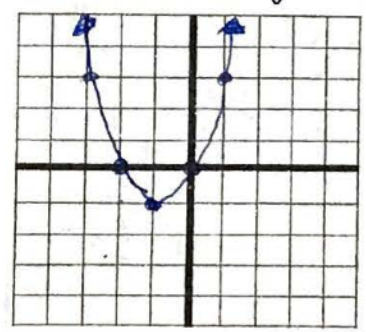
Set Notations: $\{x\in\mathbb{R} \mid -3<x\leq 1\}$

For problem 13-14, please give the name of the parent function and describe the transformation represented. Then sketch the graph of the given function.

13. $g(x)=(x+1)^2-1$

Parent Function: Quadratic

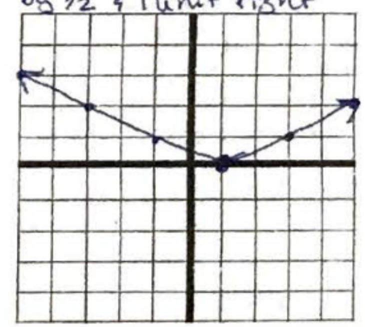
Transformation: 1 unit left and 1 unit up



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

Parent Function: Absolute Value

Transformation: vertically compressed by 1/2 & 1 unit right



Give the parent function and write the equation of the transformation function f(x).

15. Absolute value—vertical shift up 5, horizontal shift right 3

$y=|x|$; $f(x)=|x-3|+5$

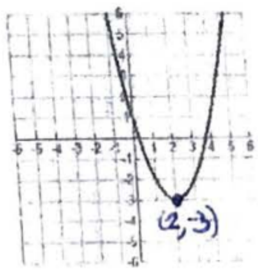
16. Quadratic—vertical stretch by 5, horizontal shift left 8

$y=x^2$; $f(x)=5(x+8)^2$

17. Square root—vertical shift down 2 $y=\sqrt{x}$; $f(x)=\sqrt{x}-2$

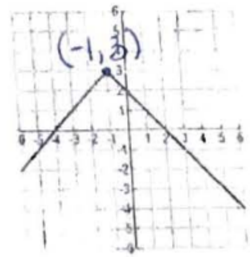
In problems 18-19, the transformation of a parent function is shown. All graphs have been only vertically translated, horizontally translated, and/or reflected over the x-axis. Write the equation of each function.

18.



$y=(x-2)^2-3$

19.



$y=-|x+1|+3$

20. Given $f(x) = 2x^2 - x$, find the following and simplify.

(a). $f(x+h)$

$= 2(x+n)^2-(x+h)$

$=2(x^2+2xh+h^2)-(x+h)$

$= 2x^2+4xh+2h^2-x-h$

$\boxed{=2x^2-x+4xh-h+2h^2}$

(b). $f(x+h)-f(x)$

$2x^2-x+4xh-h+2h^2-(2x^2-x)$

$\cancel{2x^2}\cancel{-x}+4xh-h+2h^2\cancel{-2x^2}\cancel{+x}$

$=\boxed{4xh-h+2h^2}$

(c). $\frac{f(x+h)-f(x)}{h}$

$\frac{4xh-h+2h^2}{h}$

$\frac{4xh-h+2h^2}{h}$

$\frac{\cancel{h}(4x-1+2h)}{\cancel{h}}$

$=\boxed{4x-1+2h}$

21. Given $C(x) = 2x^2 - 4x + 3$, find and simplify $\frac{C(x+h)-C(x)}{h}$.

$C(x+h) = 2(x+h)^2-4(x+h)+3$

$= 2(x^2+2xh+h^2)-4x-4h+3$

$= 2x^2+4xh+2h^2-4x-4h+3$

$\frac{C(x+h)-C(x)}{h} = \frac{2x^2+4xh+2h^2-4x-4h+3-(2x^2-4x+3)}{h}$

$= \frac{\cancel{2x^2}+4xh+2h^2\cancel{-4x}-4h\cancel{+3}\cancel{-2x^2}\cancel{+4x}\cancel{-3}}{h}$

$= \frac{4xh+2h^2-4h}{h} \rightarrow \frac{\cancel{h}(4x+2h-4)}{\cancel{h}}$

Perform the indicated operation.

1) $f(x) = x - 5x$
$g(x) = 2x - 1$
Find $f(g^{-1}(x))$

2) $g(n) = -n^2 - 2n + 1$
$f(n) = n - 1$
Find $g(f(n))$

3) $h(n) = 3n - 4$
$g(n) = n - 3$
Find $(h \circ g)^{-1}(n)$

4) $g(a) = 4a - 3$
$h(a) = 2a + 4$
Find $g^{-1}(h^{-1}(a))$

5) $g(x) = -4x - 4$
$h(x) = x - 2$
Find $(g^{-1} \circ h)(-7)$

6) $f(t) = 4t - 5$
Find $f(f(4))$

Look at 3rd page

State if the given functions are inverses.

7) $g(x) = -2x - 2$
$f(x) = -2x + 2$

8) $f(x) = \frac{1}{2}x$
$g(x) = 2x$

9) $f(x) = -\frac{1}{4}x + \frac{1}{4}$
$g(x) = -5x + 3$

10) $f(n) = 4n - 4$
$g(n) = \frac{-n-3}{6}$

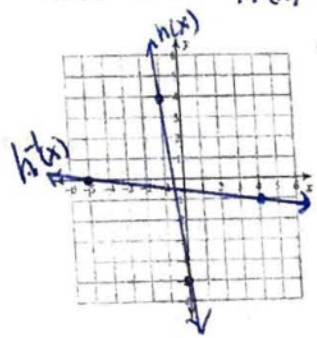
Find the inverse of each function. Then graph the function and its inverse.

11) $h(x) = -9x - 5$

$h^{-1}(x) = \frac{x+5}{-9}$

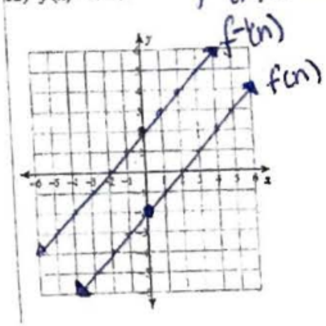
$= \frac{-x-5}{9}$

x	y
-5	0
4	-1



12) $f(n) = n - 2$

$f^{-1}(n) = n+2$



1) Find $f(g^{-1}(x))$

$f(x) = x - 5x \Rightarrow 4x$

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

$f(g^{-1}(x)) = -\cancel{4}^{2}\left(\frac{x+1}{\cancel{2}_1}\right)$

$= -2(x+1)$

$= \boxed{-2x-2}$

2) Find $g(f(n)) = -(n-1)^2 - 2(n-1) +$

$g(n) = -n^2 - 2n + 1$

$f(n) = n-1$

$= -(n^2 - 2n + 1) - 2n + 2$

$= -n^2 + \cancel{2n} - \cancel{1} - \cancel{2n} + 2 +$

$= \boxed{-n^2 + 2}$

3) Find $(h \circ g)^{-1}(n) = h^{-1}(g^{-1}(n))$

$h(n) = 3n - 4$

$h^{-1}(n) = \frac{n+4}{3}$

$g(x) = n - 3$

$g^{-1}(x) = n + 3$

$= \frac{(n+3)+4}{3}$

$= \boxed{\frac{n+7}{3}}$

4) Find $g^{-1}(h^{-1}(a))$

$g(a) = 4a - 3$ $\quad h(a) = 2a + 4$

$g^{-1}(a) = \frac{a+3}{4}$ $\quad h^{-1}(a) = \frac{a-4}{2}$

$= \frac{\left(\frac{a-4}{2}\right) + \frac{3 \cdot 2}{1 \cdot 2}}{4}$

$= \frac{\frac{a-4}{2} + \frac{6}{2}}{4} \Rightarrow \frac{\frac{a+2}{2} \cdot \frac{1}{4}}{\frac{\cancel{4}}{1} \cdot \frac{1}{\cancel{4}}}$

$= \boxed{\frac{a+2}{8}}$

5) Find $(g^{-1} \circ h)(-7) \Rightarrow g^{-1}(h(-7))$

$g(x) = -4x - 4$

$g^{-1}(x) = \frac{x+4}{-4}$

$h(x) = x - 2$

$h(-7) = -7 - 2 = \underline{-9}$

$g^{-1}(h(-7)) = \frac{-9+4}{-4}$

$= \frac{-5}{-4} = \frac{5}{4}$

#8) $f(g(x)) = f(2x)$

$= \frac{1}{2}(2x)$

$= x$ ✓

yes, inverse

$g(f(x)) = g(\frac{1}{2}x)$

$= 2(\frac{1}{2}x)$

$= x$ ✓

#9) $f(x) = -\frac{1}{4}x + \frac{1}{4}$

$g(x) = -5x + 3$

Not Inverse

b/c ~~Not~~ not (=) to x

$f(g(x)) = f(-5x+3)$

$= -\frac{1}{4}(-5x+3) + \frac{1}{4}$

$= \frac{5x}{4} + \frac{3}{4} + \frac{1}{4}$

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

$= \frac{5}{4}x + 1$ NO

#10) $f(x) = 4n - 4$

$g(x) = -\frac{n-3}{6}$

Not an Inverse

b/c Not (=) to x.

$f(g(x)) = f(-n-3)$

$= 4\frac{(-n-3)}{6} - \frac{4}{1}$

$=$

$=$

$\frac{-4n-12}{6} - \frac{4 \cdot 6}{1 \cdot 6}$

$\frac{-4n-12-24}{6}$

$$\frac{-4n-36}{6}$$

OR

$$= -\frac{2}{3}n - 6$$