completed

6.1 – 6.3 TEST REVIEW

Learning Target 6A
Given: $f(x) = x^2 + 4x - 5$ **and** $g(x) = x^2 - 1$; perform each operation and indicate any domain restrictions.

1. (f+g)(x)=

$f(x)+g(x)$

$(x^2+4x-5)+(x^2-1)$

$\boxed{2x^2+4x-6}$

2. (f-g)(x) =

$f(x)-g(x)$

$(x^2+4x-5)-(x^2-1)$

$x^2+4x-5-x^2+1$

$\boxed{4x-4}$

division requires domain restrictions

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

$f(x) \cdot g(x)$

$(x^2+4x-5)(x^2-1)$

$x^4-x^2+4x^3-4x-5x^2+5$

$\boxed{x^4+4x^3-6x^2-4x+5}$

4. $\left(\frac{f}{g}\right)(x) =$

$\frac{f(x)}{g(x)} = \frac{x^2+4x-5}{x^2-1} = \frac{(x+5)\cancel{(x-1)}}{(x+1)\cancel{(x-1)}}$

factor b/c x^2

cannot be 0!

$(x+1)(x-1)=0$

$x=-1 \quad x=1$

$\boxed{\frac{f}{g} = \frac{x+5}{x+1}}$

$\boxed{D: \mathbb{R}, x \neq -1, 1}$

Given: $f(x) = 4x + 3$; $g(x) = 3x - 1$; **and** $h(x) = x^2 + 3x + 2$

5. f(g(-3)) =

1st: $g(-3) = 3(-3)-1$
$= -9-1$
$= -10$

2nd: $f(-10) = 4(-10)+3$
$= -40+3$

$\boxed{f(g(-3) = -37}$

6. h(g(4))=

1st: $g(4) = 3(4)-1$
$= 12-1$
$= 11$

$h(11) = (11)^2+3(11)+2$
$= 121+33+2$

$\boxed{h(g(4)) = 156}$

7. f(h(-1))=

1st: $h(-1) = (-1)^2+3(-1)+2$
$= 1-3+2$
$= 0$

2nd: $f(0) = 4(0)+3$
$= 3$

$\boxed{f(h(-1)) = 3}$

Find f(g(x)) and g(f(x)) . Note any domain restrictions if they exist.

8. $f(x) = 2x^2 - 7$ and $g(x) = 5x + 3$

$f(g(x)) = 2(5x+3)^2 - 7$
$= 2(5x+3)(5x+3) - 7$
$= 2(25x^2+15x+15x+9) - 7$
$= 2(25x^2+30x+9) - 7$
$= 50x^2+60x+18-7$
$\boxed{= 50x^2+60x+11}$

$g(f(x)) = 5(2x^2-7)+3$
$= 10x^2-35+3$
$\boxed{= 10x^2-32}$

Find f(g(x)) and g(f(x)). Note any domain restrictions if they exist.

9. $f(x) = -5x^2 - 3$ and $g(x) = x + 2$

$f(g(x)) = -5(x+2)^2 - 3$

$= -5(x+2)(x+2) - 3$

$= -5(x^2+4x+4) - 3$

$= -5x^2 - 20x - 20 - 3$

$\boxed{f(g(x)) = -5x^2 - 20x - 23}$

$g(f(x)) = (-5x^2-3)+2$

$\boxed{= -5x^2 - 1}$

Learning Target 6B

Write the inverse for each of the following functions. Remember to use inverse function notation if the inverse is a function!

10. $f(x) = 4x - 9$

switch x + y ① $x = 4y - 9$

solve for y ② $x + 9 = 4y$

$\frac{x}{4} + \frac{9}{4} = y$

write in $f^{-1}(x)$ ③ $\boxed{f^{-1}(x) = \frac{1}{4}x + \frac{9}{4}}$

11. $g(x) = -\frac{2}{5}x - 3$

① $x = -\frac{2}{5}y - 3$

② $\frac{5}{-2}\left(x + 3 = -\frac{2}{5}y\right)\frac{5}{-2}$

$-\frac{5}{2}x - \frac{15}{2} = y$

$\boxed{③\ f^{-1}(x) = \frac{-5}{2}x - \frac{15}{2}}$

Use composition to determine if the given functions are inverses of one another.

$f(g(x)) = g(f(x)) = x$

If this is true, they are inverses

12. $f(x) = x^2 - 1$
$g(x) = +\sqrt{x+1}$

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

$= x + 1 - 1$

$= x$ ✓

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

$= \sqrt{x^2}$

$= x$ ✓

yes they are inverses

13. $f(x) = 5x + 3$
$g(x) = \frac{1}{5}x + 15$

$f(g(x)) = 5(\frac{1}{5}x + 15) + 3$

$= x + 75 + 3$

$= x + 78$ X

not inverses

Identify domain and range for the relation and its inverse.

14. relation

X	-8	-2	4
Y	2	4	6

Domain: $\{-8,-2,4\}$

Range: $\{2,4,6\}$

Inverse:

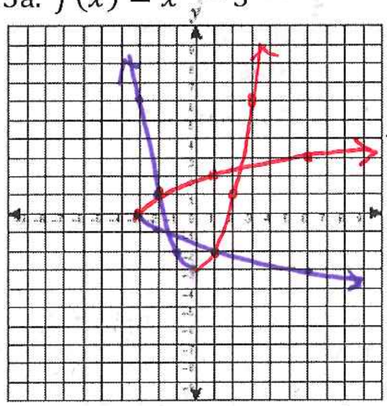
X	2	4	6
Y	-8	-2	4

Domain: $\{2,4,6\}$

Range: $\{-8,-2,4\}$

Write the inverse for each of the following functions. Restrict the domain of the original function so that the inverse is a function. Remember to use inverse function notation if the inverse is a function!

15a. $f(x) = x^2 - 3$



$x = y^2 - 3$

$x + 3 = y^2$

$\pm\sqrt{x+3} = y$

Domain Restriction:

$f(x)$ D: $x \geq 0$ $[0,\infty)$

Inverse Function:

$f^{-1}(x) = \sqrt{x+3}$

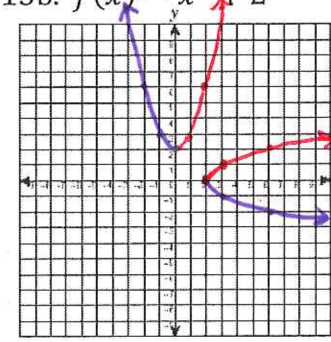
Domain Restriction:

$f(x)$ D: $x \leq 0$ $(-\infty,0]$

Inverse Function:

$f^{-1}(x) = -\sqrt{x+3}$

15b. $f(x) = x^2 + 2$



$x = y^2 + 2$

$x - 2 = y^2$

$\pm\sqrt{x-2} = y$

Domain Restriction:

$f(x)$ D: $x \geq 0$ $[0,\infty)$

Inverse Function:

$f^{-1}(x) = \sqrt{x-2}$

Domain Restriction:

$f(x)$ D: $x \leq 0$ $(-\infty,0]$

Inverse Function:

$f^{-1}(x) = -\sqrt{x-2}$

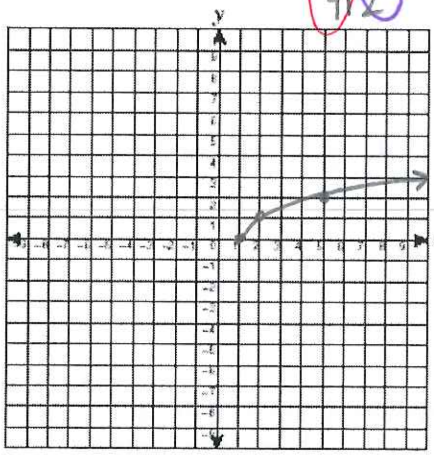
Learning Target 6C

Graph each function. State the domain and range and the Min/Max point. Also, identify the transformations.

16. $f(x) = \sqrt{x-1}$

x	y
0	0
1	1
4	2

x+1	y
1	0
2	1
5	2



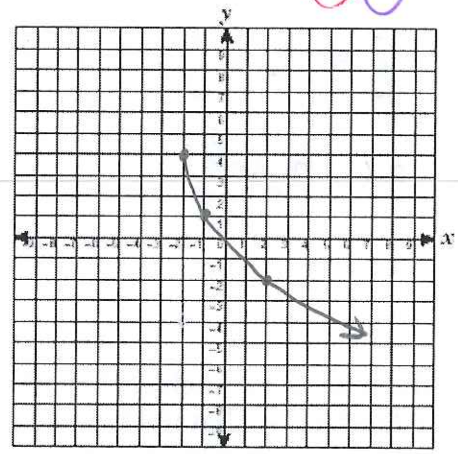
vertex: (1,0)

Domain: $x \geq 1$ $[1, \infty)$
Range: $y \geq 0$ $[0, \infty)$
Max/Min Point: minimum
Transformations:
right 1

17. $g(x) = -3\sqrt{x+2} + 4$

x	y
0	0
1	1
4	2

x −2	−3y+4
−2	4
−1	1
2	−2



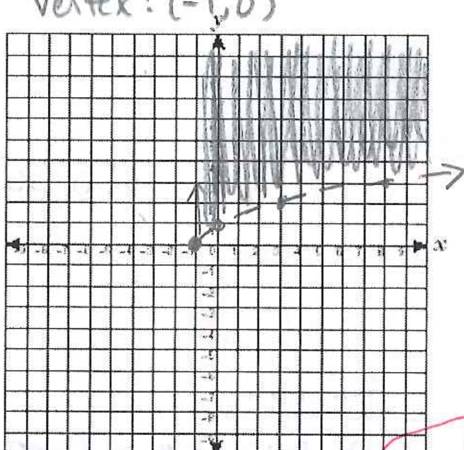
Domain: $x \geq -2$ $[-2, \infty)$
Range: $y \leq 4$ $(-\infty, 4]$
Max/Min Point: vertex: (−2,4) max
Transformations:
reflect, stretch by 3
left 2
up 4

Graph each inequality. And identify the transformations.

18. $g(x) > \sqrt{x+1}$

vertex: (−1,0)

dotted
shade
above



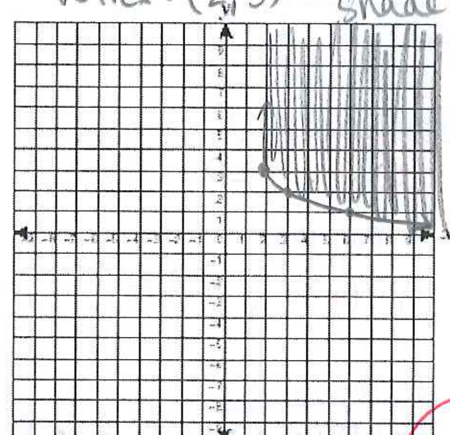
x	y
0	0
1	1
4	2

x−1	y
−1	0
0	1
3	2

Transformations:
left 1

19. $f(x) \geq -\sqrt{x-2} + 3$

vertex: (2,3)
solid line
shade above



x	y
0	0
1	1
4	2

x+2	−y+3
2	3
3	2
6	1

Transformations:
reflect
right 2
up 3