6.1 – 6.3 QUIZ REVIEW

6.1 Operations with Functions

Given: $f(x) = x^2 - 6x - 16$ **and** $g(x) = x - 8$; perform each operation and indicate any domain restrictions.

1. (f+g)(x)=

$(x^2-6x-16)+(x-8)$

$= x^2-6x-16+x-8$

$= x^2-5x-24$

2. (f-g)(x) =

$(x^2-6x-16)-(x-8)$

$= x^2-6x-16-x+8$

$= x^2-7x-8$

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

$(x-8)(x^2-6x-16)$

$= x^3-6x^2-16x-8x^2+48x+128$

$= x^3-14x^2+32x+128$

4. $\left(\frac{f}{g}\right)(x) = \frac{x^2-6x-16}{x-8}$

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

$x \neq 8$

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

5. $f(x) = 2x - 1$ and $g(x) = 8x^2 + 3$

$f(g(x)) = 2(8x^2+3)-1$

$= 16x^2+6-1$

$= 16x^2+5$

$g(f(x)) = 8(2x-1)^2+3$

$= 8[(2x-1)(2x-1)]+3$

$= 8(4x^2-4x+1)+3$

$= 32x^2-32x+8+3$

$= 32x^2-32+11$

6. $f(x) = -3x$ and $g(x) = -x + 8$

$f(g(x)) = -3(-x+8)$

$= 3x-24$

$g(f(x)) = -(-3x)+8$

$= 3x+8$

Given: $f(x) = -2x + 2$; $g(x) = 5x$; **and** $h(x) = x^2 + 6x + 8$

7. f(g(-2)) = $g(-2) = \boxed{-10}$

$f(-10) = -2(-10)+2$

$= 22$

8. h(g(2))= $g(2) = \boxed{10}$

$h(10) = 10^2+6(10)+8$

$= 168$

9. f(h(-3))= $h(-3) = (-3)^2+6(-3)+8$

$= 9-18+8 = \boxed{-1}$

$f(-1) = -2(-1)+2$

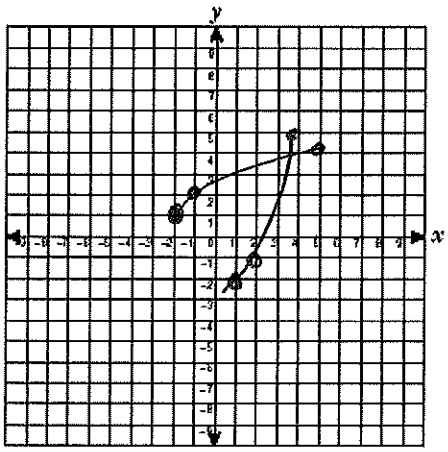
$= 2+2 = 4$

6.2 Inverse Functions & relations

Graph and connect the set of points and their inverse. Identify domain and range.

10. relation

x	-2	-1	5
y	1	2	4



Domain: $\{-2 \le x \le 5\}$
Range: $\{1 \le y \le 4\}$

Inverse:

x	1	2	4
y	-2	-1	5

Domain: $\{1 \le x \le 4\}$
Range: $\{-2 \le y \le 5\}$

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

11. $f(x) = 3x - 12$

$y = 3x - 12$
$x = 3y - 12$
$+12 \quad +12$
$\frac{x+12}{3} = \frac{3y}{3}$

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

12. $g(x) = -\frac{3}{4}x + 6$

$y = -\frac{3}{4}x + 6$
$x = -\frac{3}{4}y + 6$
$\left(-\frac{4}{3}\right)(x - 6) = \left(-\frac{3}{4}y\right)\left(-\frac{4}{3}\right)$

$f^{-1}(x) = -\frac{4}{3}x + 8$

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

13. $f(x) = (x+6)^2$
$g(x) = \sqrt{x} - 6$

$f(g(x)) = [(\sqrt{x} - 6) + 6]^2$
$= (\sqrt{x})^2$
$= x$ ✓

$g(f(x)) = \sqrt{(x+6)^2} - 6$
$= x + 6 - 6$
$= x$ ✓

Yes! They are inverses

14. $f(x) = \frac{1}{4}x - 4$
$g(x) = 4x + 8$

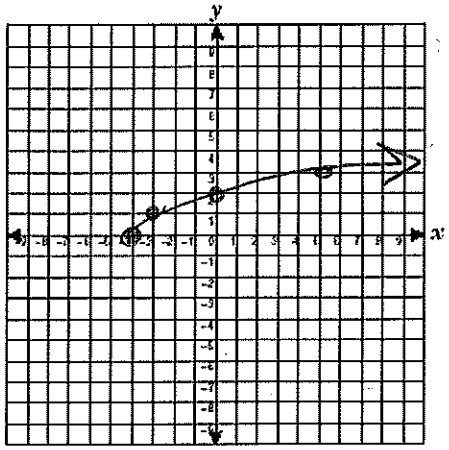
$f(g(x)) = \frac{1}{4}(4x + 8) - 4$
$= x + 2 - 4$
$= -2$ X

no! they are not inverses

6.3 Square Root Functions & Inequalities

Graph each function. Identify domain and range for each equation.

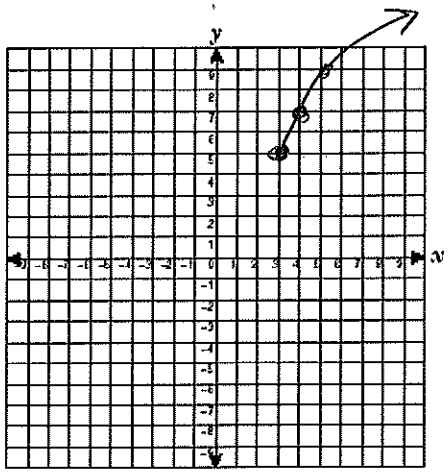
15. $f(x) = \sqrt{x+4}$



vertex (-3, 0)

Domain: $x \geq -4$
Range: $y \geq 0$

16. $g(x) = 2\sqrt{x-3}+5$



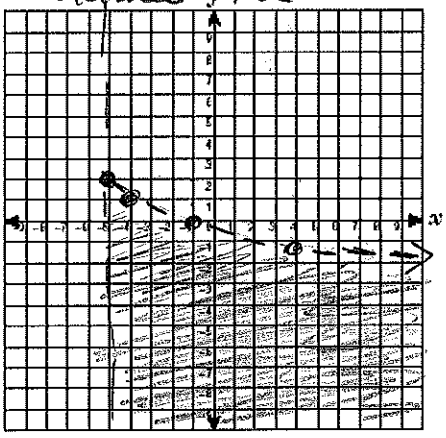
vertex (3, 5)

Domain: $x \geq 3$
Range: $y \geq 5$

Graph each inequality.

17. $g(x) \leq -\sqrt{x+5}+2$

dashed line



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

solid line