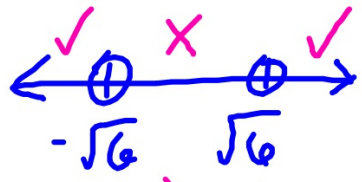
1. $y = \frac{x-4}{\sqrt{x^2-6}}$

$x^2-6>0$

$x^2>6$



$D:(-\infty,-\sqrt{6})\cup(\sqrt{6},\infty)$

2. $y = \frac{1}{\sqrt{25-x^2}}$

$25-x^2>0$

$25>x^2$

$x^2<25$

$D:(-5,$

3. $y = \frac{x-3}{x^2-16}$

$x^2-16\neq 0$

$x^2\neq 16$

$x\neq \pm 4$

$D:(-\infty,-4)\cup(-4,4)\cup(4,\infty)$

4. $y = \sqrt{4-x^2}$

$4-x^2\geq 0$

$4\geq x^2$

$x^2\leq 4$

$D:[-2,$

5. $y = \frac{1}{3x-9}$

$3x-9\neq 0$

$3x\neq 9$

$x\neq 3$

$D:(-\infty,3)\cup(3,\infty)$

6. $y = 3x-4$

$D:(-\infty,\infty)$

7. Determine if the following are inverses.

$f(x) = x^2 + 3$ and $g(x) = \pm\sqrt{x-3}$

$f(g(x)) = \left(\pm\sqrt{x-3}\right)^2 + 3$

$= x - 3 + 3$

$= x$

$g(f(x)) = \pm\sqrt{x^2+3-3}$

$= \pm\sqrt{x^2}$

$= x$

Find the inverse. Graph both the original function and its inverse.

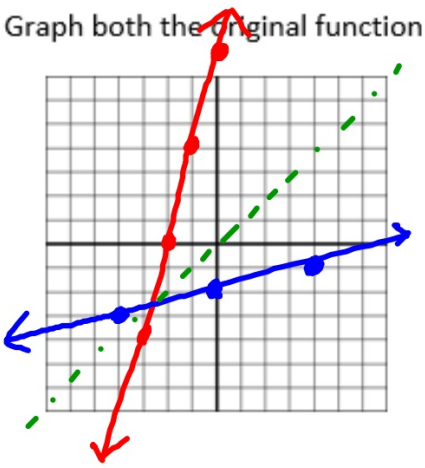
8. $f(x) = 4(x + 2)$

$f(x) = 4x + 8$

$x = 4y + 8$

$x - 8 = 4y$

$y^{-1} = \frac{1}{4}x - 2$

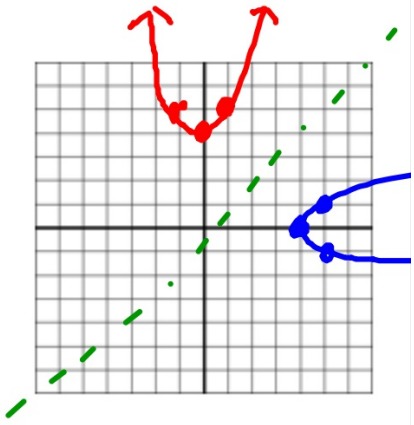


9. $f(x) = x^2 + 4$

$x = y^2 + 4$

$x - 4 = y^2$

$y^{-1} = \pm\sqrt{x - 4}$



10. $f(x) = x - 3$ $g(x) = x + 4$

a. Find $f^{-1}(x) \cdot g^{-1}(x)$

$y = x - 3$

$(= y - 3$

$^{-1} = x + 3$

$x) = x + 3$

$y = x + 4$

$x = y + 4$

$y^{-1} = x - 4$

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

$(x+3)(x-4)$

$x^2 - x - 12$

b. Find $\frac{f(x)}{g(x)}$

$= \frac{x-3}{x+4}, x \neq -4$

11. $f(x) = x^2 - x + 7$ Evaluate $f(x-1)$

$F(x-1) = (x-1)^2 - (x-1) + 7$

$= x^2 - 2x + 1 - x + 1 + 7$

$= x^2 - 3x + 9$

12. $f(x) = x^2 + 2 \qquad g(x) = x - 1$

a. find $f(x) - g(x)$

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

$= x^2 + 2 - x + 1 = \boxed{x^2 - x + 3}$

b. find $f(g(x))$

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

$= x^2 - 2x + 1 + 2$

$= \boxed{x^2 - 2x + 3}$

c. find $(fg)(-1)$

$f(-1) \cdot g(-1)$

$3 \cdot -2$

$\boxed{-6}$

13. Write the equation of the line perpendicular to 2x-3y = -5 through (-1, 4).

$m = \frac{-2}{-3} = \frac{2}{3} \Rightarrow m = \frac{-3}{2}$

$y = mx + b$

$4 = \frac{-3}{2}(-1) + b$

$4 = \frac{3}{2} + b$

$\frac{5}{2} = b$

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

14. Find the equation of a circle whose diameter has endpoints (2, -5), (8, -1).

Center: $(5, -3)$

$$(x-h)^2+(y-k)^2=r^2$$

$$(x-5)^2+(y+3)^2=13$$

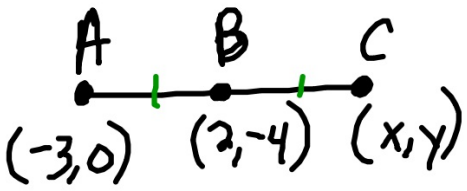
$$d=\sqrt{(8-2)^2+(-1+5)^2}$$

$$d=\sqrt{36+16}=\sqrt{52}$$

$$d=2\sqrt{13}$$

$$r=\sqrt{13}$$

15. B is the midpoint of $\overline{AC}$. If B is (2, -4) and A is (-3, 0), find C.



$\frac{x-3}{2} = 2$

$x-3=4$

$x=7$

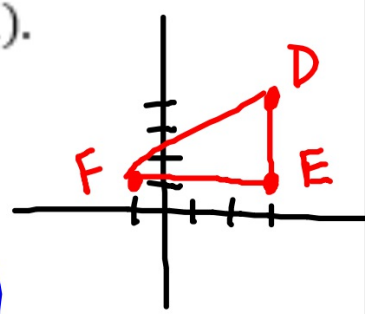
$\frac{y+0}{2} = -4$

$y=-8$

C: (7, -8)

16. ΔDEF has vertices D(3,4), E(3, 1), F(-1,1).

A. Find the equation of the median from D.



midpt $\overline{FE}$: (1, 1), D: (3, 4)

$m = \frac{4-1}{3-1} = \frac{3}{2}$

$y = mx + b$

$1 = \frac{3}{2}(1) + b$

$1 = \frac{3}{2} + b$

$b = -\frac{1}{2}$

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

B. Find the equation of the altitude from E.

slope of $\overline{FD} = \frac{1-4}{-1-3} = \frac{-3}{-4} = \frac{3}{4} \Rightarrow m = -\frac{4}{3}$, E (3, 1)

$y = mx + b$

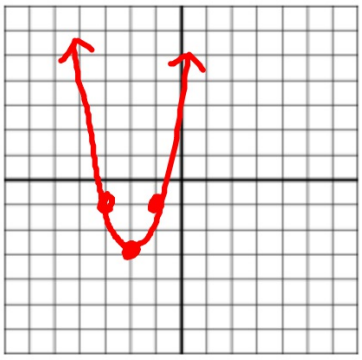
$1 = -\frac{4}{3}(3) + b$

$1 = -4 + b$

$5 = b$

$y = -\frac{4}{3}x + 5$

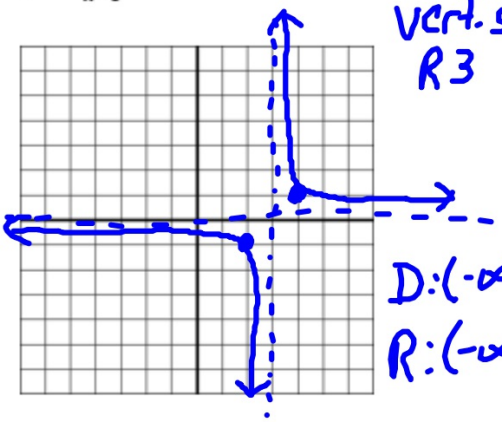
17. $y = 2(x+2)^2 - 3$



vert. stretch
L2
D3

D:$(-\infty,\infty)$
R:$[-3,\infty)$

18. $y = \frac{2}{x-3}$



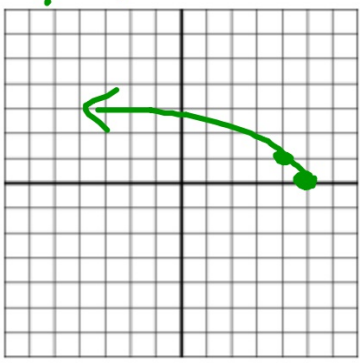
vert. stretch
R3

D:$(-\infty,3) \cup (3,\infty)$
R:$(-\infty,0) \cup (0,\infty)$

19. $y = \sqrt{-x+5}$

$y = \sqrt{-(x-5)}$

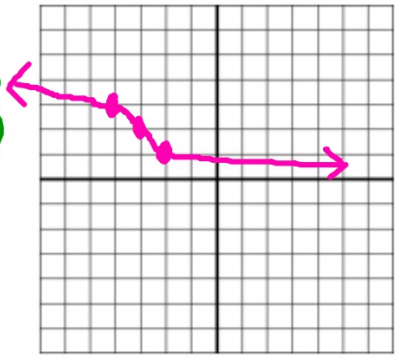
Refl. y-axis
R5



D:$(-\infty,5]$
R:$[0,\infty)$

20. $y = -\sqrt[3]{x+3} + 2$

Refl. x-axis
L3, U2



D:$(-\infty,\infty)$
R:$(-\infty,\infty)$

21. $y = \frac{1}{2}x^3 - 1$

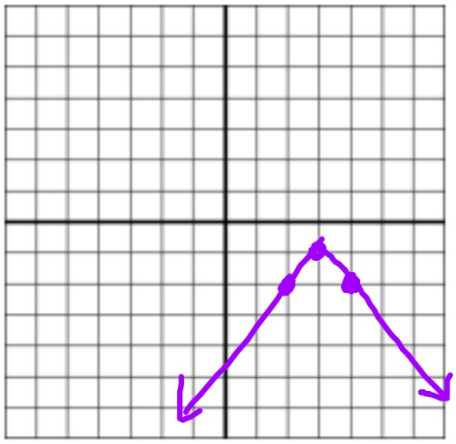
Vert. shrink

D1

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

22. $y = -|x - 3| - 1$



Refl. x-axis

R3, D1

D: $(-\infty, \infty)$

R: $(-\infty, -1]$

23. $y = x^3 - 4x^2 + x + 6$

Zeros- $-1, 3, 2$

Max- $(.131, 6.065)$

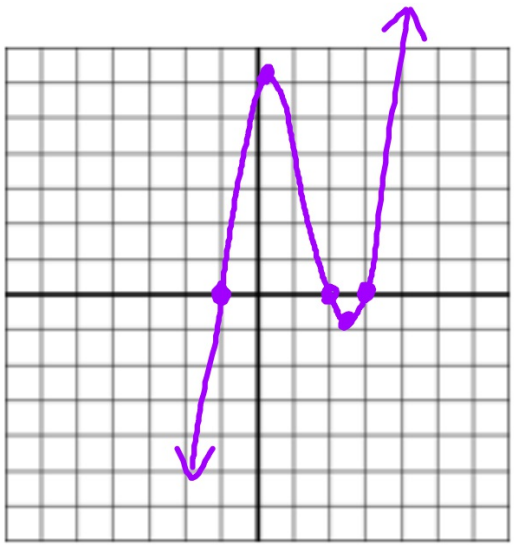
Min- $(2.535, -.879)$

Increase- $(-\infty, .131) \cup (2.535, \infty)$

Decrease- $(.131, 2.535)$

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$



24. $y = -2x^3 + x^2 + 18x - 9$

Zeros- $-3, \frac{1}{2}, 3$

Max- $(1.907, 15.092)$

Min- $(-1.573, -27.055)$

Increase- $(-1.573, 1.907)$

Decrease- $(-\infty, -1.573) \cup (1.907, \infty)$

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$