...te a piecewise function and state the domain and range

$$f(x) = \begin{cases} 2 & , x < -4 \\ -x-2 & , -4 < x < 2 \\ x-6 & , x > 2 \end{cases}$$

D: $(-\infty, \infty)$
R: $(-4, 2]$

$$f(x) = \begin{cases} -4 & , x \leq -2 \\ x-2 & , -2 \leq x \leq 2 \\ -2x+4 & , x \geq 2 \end{cases}$$

D: $(-\infty, \infty)$
R: $(-\infty, 2)$

$$f(x) = \begin{cases} -2x-1 & , x \leq 2 \\ -x+4 & , x > 2 \end{cases}$$

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

Solve & Graph Absolute Value Equations & Inequalities

$|3x-7| = 2$

$3x - \cancel{7} = 2$ $\quad$ $3x - \cancel{7} = -2$
$\cancel{+7} \quad +7$ $\quad$ $\cancel{+7} \quad +7$

$\frac{\cancel{3}x}{\cancel{3}} = \frac{9}{3}$ $\quad$ $\frac{3x}{3} = \frac{5}{3}$

$\boxed{x = 3}$ $\quad$ $\boxed{x = 5/3}$

$2|x-1| - \cancel{4} \geq 2$
$\cancel{+4} \quad +4$

$\frac{\cancel{2}|x-1|}{\cancel{2}} \geq \frac{6}{2}$

$|x-1| \geq 3$

$x - \cancel{1} \geq 3$ $\quad$ $x - 1 \leq -3$
$\cancel{+1} \quad +1$ $\quad$ $+1 \quad +1$

$\boxed{x \geq 4}$ $\quad$ $\boxed{x \leq -2}$

$\frac{\cancel{3}|4x-1|}{\cancel{3}} \leq \frac{9}{3}$

$|4x-1| \leq 3$

$-3 \leq 4x - \cancel{1} \leq 3$
$+1 \quad \cancel{+1} \quad +1$

$\frac{-2}{4} \leq \frac{4x}{4} \leq \frac{4}{4}$

$\boxed{-\frac{1}{2} \leq x \leq 1}$

$|x^2+1| = 5$

$x^2 + \cancel{1} = 5$ $\quad$ $x^2 + \cancel{1} = -5$
$\cancel{-1} \quad -1$ $\quad$ $\cancel{-1} \quad -1$

$\sqrt{x^2} = \sqrt{4}$ $\quad$ $\sqrt{x^2} = \sqrt{-6}$

$\boxed{x = 2}$ $\quad$ $\cancel{x = \sqrt{-6}}$

$|3x+2| = 10$

$3x + \cancel{2} = 10$ $\quad$ $3x + 2 = -10$
$\cancel{-2} \quad -2$ $\quad$ $-2 \quad -2$

$\frac{\cancel{3}x}{\cancel{3}} = \frac{8}{3}$ $\quad$ $\frac{3x}{3} = \frac{-12}{3}$

$\boxed{x = \frac{8}{3}}$ $\quad$ $\boxed{x = -4}$

$|x+3| < -6$

~~$|x+3| < -6$~~ ~~$x+3$~~

An absolute value can never be less than a negative number there is no solution.

1.8

Evaluate the functions

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

$g(f(0))$

$f(0) = 2(0) - 1$
$= -1$

$g(f(0)) = 3(-1)$
$= \boxed{-3}$

$(h \circ g)(x)$

$h(g(x))$

$h(g(x)) = (3x)^2 + 1$
$\boxed{= 9x^2 + 1}$

$f(g(h(2)))$

$h(2) = (2)^2 + 1$
$= 5$

$g(h(2)) = 3(5)$
$= 15$

$f(g(h(2))) = 2(15) - 1$
$\boxed{= 29}$

Given $f(x) = 9 - x$ $g(x) = x^2 + x$ and $h(x) = x - 2$. Compute:

$(g \circ f)(3)$

$g(f(3))$

$f(3) = 9 - 3$
$= 6$

$g(f(3)) = (6)^2 + 6$
$\boxed{= 42}$

$f(g(x))$

$f(g(x)) = 9 - (x^2 + x)$
$\boxed{= -x^2 - x + 9}$

$h(f(-6))$

$f(-6) = 9 - (-6)$
$= 15$

$h(f(-6)) = (15) - 2$
$\boxed{= 13}$

$f(h(x))$

$f(h(x)) = 9 - (x - 2)$
$= 9 - x + 2$
$\boxed{= -x + 11}$

$(h \circ g)(11)$

$h(g(11))$

$g(11) = (11)^2 + 11$
$= 132$

$h(g(11)) = 132 - 2$
$\boxed{= 130}$

$g(h(x))$

$g(h(x)) = (x-2)^2 + (x-2)$
$= (x-2)(x-2) + (x-2)$
$= x^2 - 2x - 2x + 4 + (x-2)$
$= x^2 - 4x + 4 + x - 2$
$\boxed{= x^2 - 3x + 2}$

ards

Wrirses

ven $f(x) = 2(x-3)^2 - 7$

b) Domain: $(-\infty, \infty)$

Range: $[-7, \infty)$

c) $y = 2(x-3)^2 - 7$

$x = 2(y-3)^2 - \cancel{7}$
$+7 \qquad\qquad +\cancel{7}$

$\dfrac{x+7}{2} = \dfrac{2(y-3)^2}{2}$

$\sqrt{\dfrac{x+7}{2}} = \sqrt{(y-3)^2}$

$\sqrt{\dfrac{x+7}{2}} = y - \cancel{3}$
$\qquad\qquad +\cancel{3}$

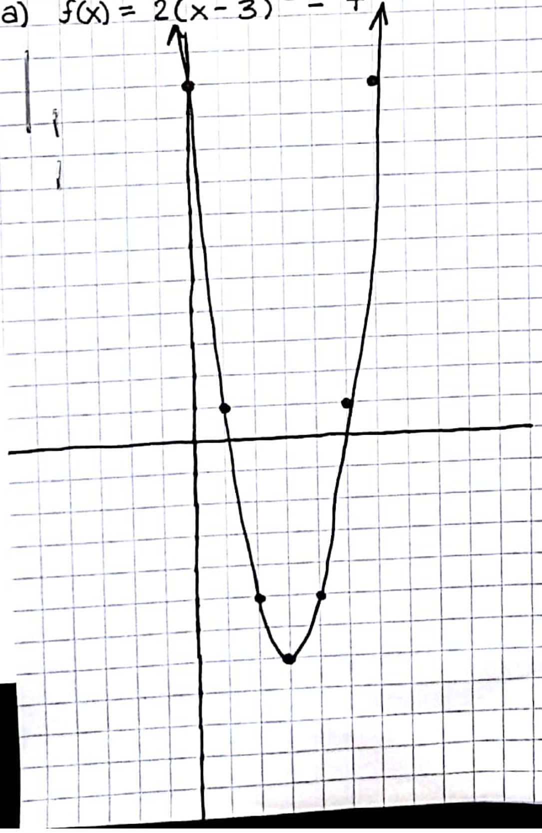
$\sqrt{\dfrac{x+7}{2}} + 3 = y$

$f(x)^{-1} = \sqrt{\dfrac{x+7}{2}} + 3$

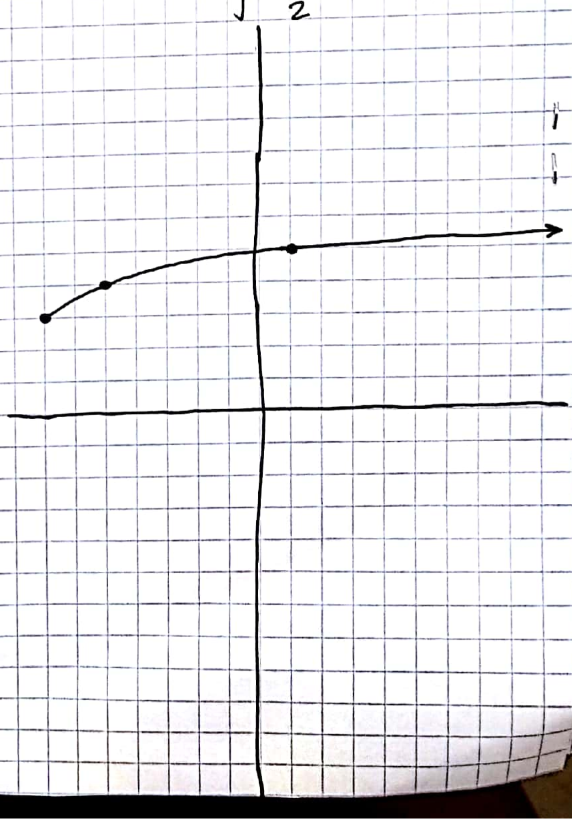
e) Domain: $[-7, \infty)$

Range: $[3, \infty)$

a) $f(x) = 2(x-3)^2 - 7$



d) $f^{-1}(x) = \sqrt{\dfrac{x+7}{2}} + 3$



Given $f(x) = -\frac{1}{2}(x-2)^2 + 6$

b) Domain: $(-\infty, \infty)$

Range: $(-\infty, 6]$

c) $y = -\frac{1}{2}(x-2)^2 + 6$

$x = -\frac{1}{2}(y-2)^2 + \cancel{6}$

$-6 \qquad\qquad -6$

$-2(x-6) = -\frac{1}{2}(y-2)^2 \cdot -2$

$\sqrt{-2x+12} = \sqrt{(y-2)^2}$

$\sqrt{-2x+12} = y - \cancel{2}$

$+2 \qquad\qquad +2$

$\sqrt{-2x+12} + 2 = y$

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

e) Domain: $(-\infty, 6]$

Range: $[2, \infty)$

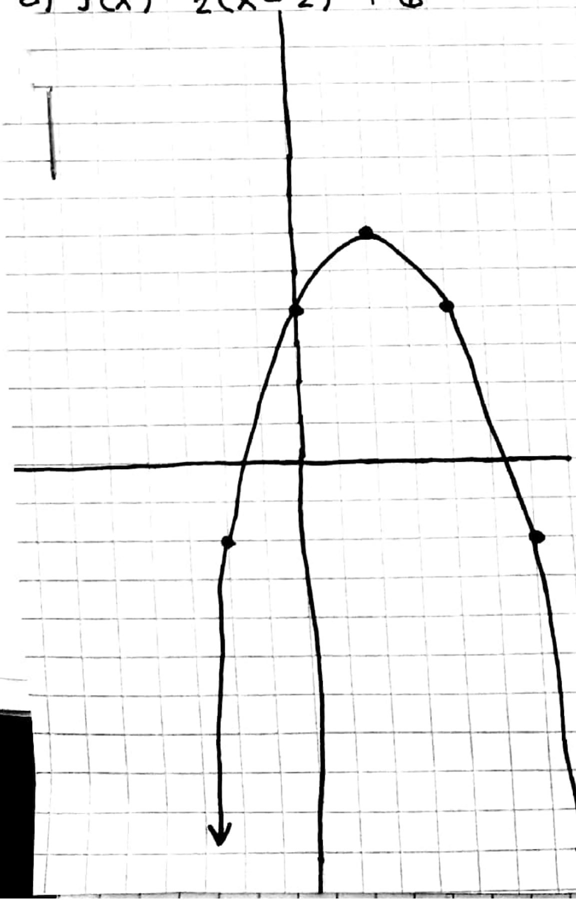
f) $f(6) = -\frac{1}{2}((6)-2)^2 + 6$

$= -2$

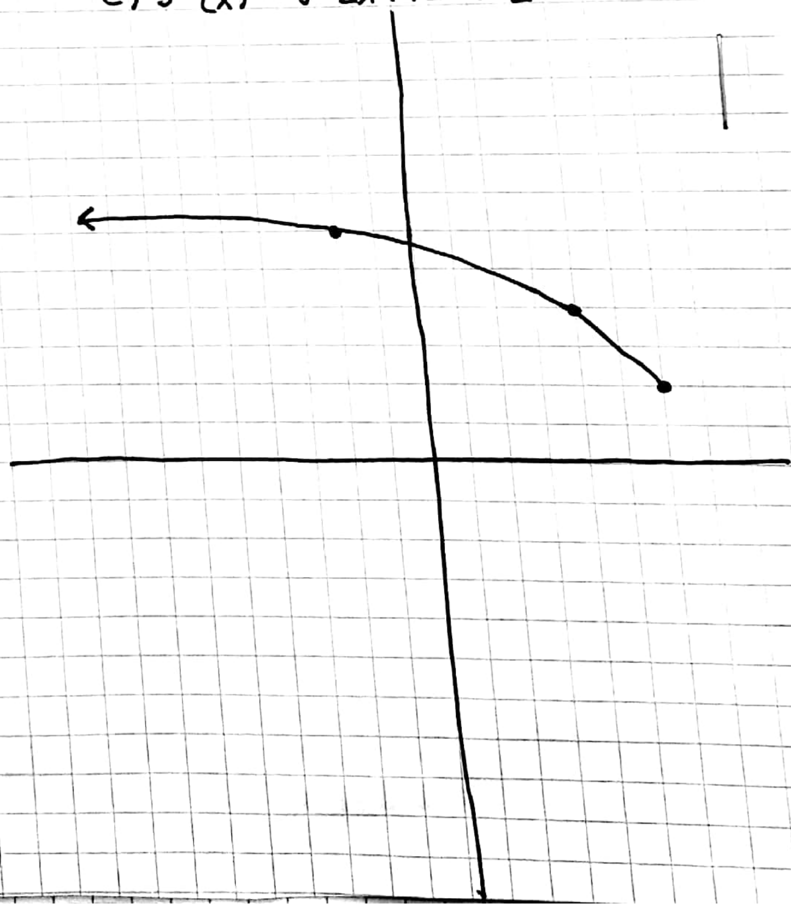
g) $f^{-1}(-2) = \sqrt{-2(-2)+12} + 2$

$= 6$

a) $f(x) - \frac{1}{2}(x-2)^2 + 6$



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



Stand the inverse of the given functions and state the domain & F. rge of the function & inverse.

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

$x = \sqrt{y+1} + \cancel{3}$
$-3 \qquad\qquad \cancel{-3}$

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

$(x-3)^2 = y+1$
$-1 \qquad\qquad -1$

$(x-3)^2 - 1 = y$

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

Domain of $f(x)$: $[-1, \infty)$
Range of $f(x)$: $[3, \infty)$
Domain of $f^{-1}(x)$: $(-\infty, \infty)$
Range of $f^{-1}(x)$: $[-3, \infty)$

Given $f(x) = 5x - 7$

$x = 5y - 7$
$+7 \qquad +7$

$\frac{x+7}{5} = \frac{5y}{5}$

$\boxed{f^{-1}(x) = \frac{x+7}{5}}$

Domain of $f(x)$: $(-\infty, \infty)$
Range of $f(x)$: $(-\infty, \infty)$
Domain of $f^{-1}(x)$: $(-\infty, \infty)$
Range of $f^{-1}(x)$: $(-\infty, \infty)$

Given $f(x) = \sqrt{x-7}$

$(x)^2 = (\sqrt{y-7})^2$

$x^2 = y - \cancel{7}$
$+7 \qquad \cancel{+7}$

$\boxed{f^{-1}(x) = x^2 + 7}$

Domain of $f(x)$: $[7, \infty)$
Range of $f(x)$: $[0, \infty)$
Domain of $f^{-1}(x)$: $(-\infty, \infty)$
Range of $f^{-1}(x)$: $[7, \infty)$

Given $f(x) = 3(x-7)^2 + 5$

$x = 3(y-7)^2 + \cancel{5}$
$\qquad\qquad \cancel{-5}$

$\frac{x-5}{3} = \frac{3(y-7)^2}{3}$

$\sqrt{\frac{x-5}{3}} = \sqrt{(y-7)^2}$

$\sqrt{\frac{x-5}{3}} = y - 7$
$+7 \qquad\qquad +7$

$\boxed{f^{-1}(x) = \sqrt{\frac{x-5}{3}} + 7}$

Domain of $f(x)$: $(-\infty, \infty)$
Range of $f(x)$: $[5, \infty)$
Domain of $f^{-1}(x)$: $[5, \infty)$
Range of $f^{-1}(x)$: $[7, \infty)$

Given $f(x) = 9x - 10$

$x = 9y - \cancel{10}$
$\qquad \cancel{+10}$

$\frac{x+10}{9} = \frac{\cancel{9}y}{\cancel{9}}$

$f^{-1}(x) = \frac{x+10}{9}$

Domain of $f(x)$: $(-\infty, \infty)$
Range of $f(x)$: $(-\infty, \infty)$
Domain of $f^{-1}(x)$: $(-\infty, \infty)$
Range of $f^{-1}(x)$: $(-\infty, \infty)$

Direct and Inverse Variation

The pressure P of a compressed gas is inversely proportional to the volume V. If there is a pressure of 25 lbs. per square in. when the volume of gas is 400 cubic in., find the pressure when the gas is compressed to 200 cubic in.

$P = \frac{k}{V}$

$400 \cdot 25 = \frac{k}{\cancel{400}} \cdot \cancel{400}$

$10000 = k$

$P = \frac{10000}{200}$

$\boxed{P = 50 \text{ lbs}}$

Hooke's Law states that the distance d that a spring is stretched by a hanging object varies directly as the mass m of the object. If the distance is 20 cm when the mass is 3 kg, what is the distance when the mass is 8 kg?

$d = km$

$\frac{20}{3} = \frac{k(\cancel{3})}{\cancel{3}}$

$k = \frac{20}{3}$

$d = \frac{20}{3}(8)$

$\boxed{= \frac{160}{3} \text{ cm or } 53.\overline{33} \text{ cm.}}$

The time T required to do a job varies inversely as the number of people P working. It takes 5 hours for 7 volunteers to pick up rubbish from 1 mile of roadway. How long would it take 12 volunteers to complete this job?

$T = \frac{k}{P}$

$7 \cdot 5 = \frac{k}{\cancel{7}} \cdot \cancel{7}$

$k = 35$

$T = \frac{35}{12}$

$\boxed{T = 2.9167 \text{ hours}}$