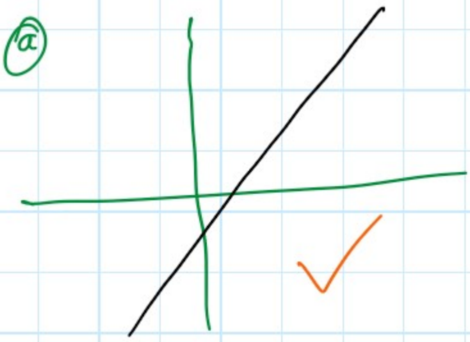
Function

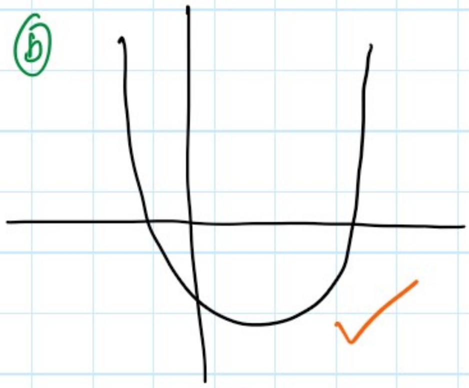
Thursday, October 22, 2020 5:50 AM

Ex Determine whether given relation is f^n or not.

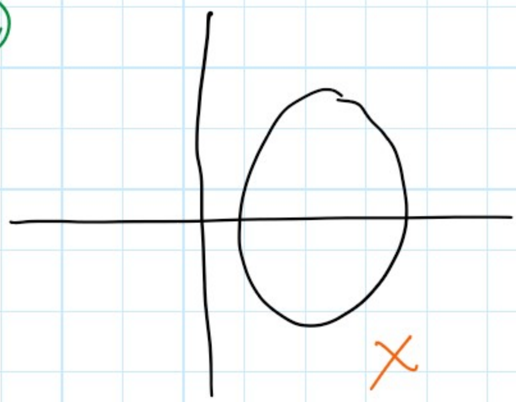
(a)



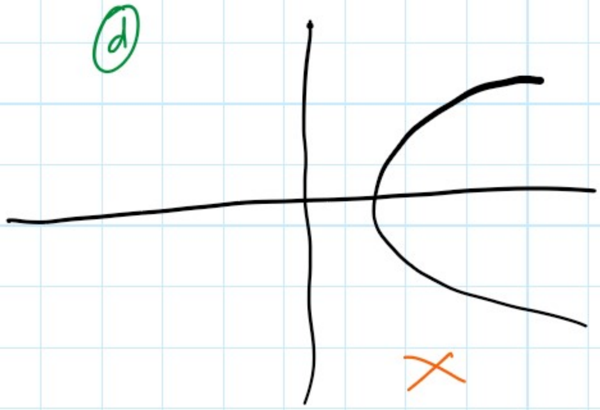
(b)



(c)



(d)



Vertical line Test.

$$y = f(x) = x^2 + 3x.$$

Ex (a) $f(x) = -2x - 1$, $f(-3)$

$f(-3) = -2(-3) - 1 = 6 - 1 = 5$ ← linear f^n.

(b) $h(x) = 3$, $h(-1)$

$h(-1) = 3$ —— constant.

Ex $f(x) = -3x^2 - 1$

Calculate $f(x+1) = -3x^2 - 6x - 4$ ✓

Ex The formula to calculate the volume of gas left in car's tank in litres after travelling of km is $V(d) = -0.115d + 60$

$V(250)$ ← Explain this in context of Q.

$V(250) = \underset{\text{vol.}}{\underline{-12.75}}$ litres.

$V(d) = 10$ ← $V(d) = -0.115d + 60$

$d = ?$

$d = \cancel{58.85}$ litres. ?

$$10 = -0.115d + 60$$

$$d = 434.78$$

$d \approx 435$ km. ✓ distance.

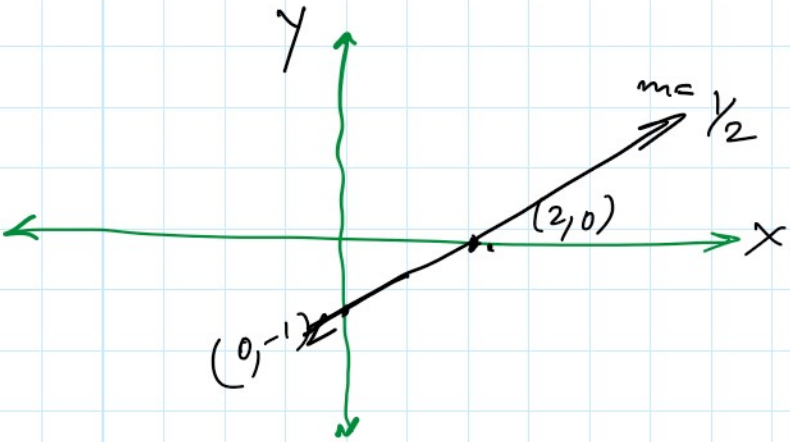
c) what values of d do not make sense for this situation.

d cannot negative.

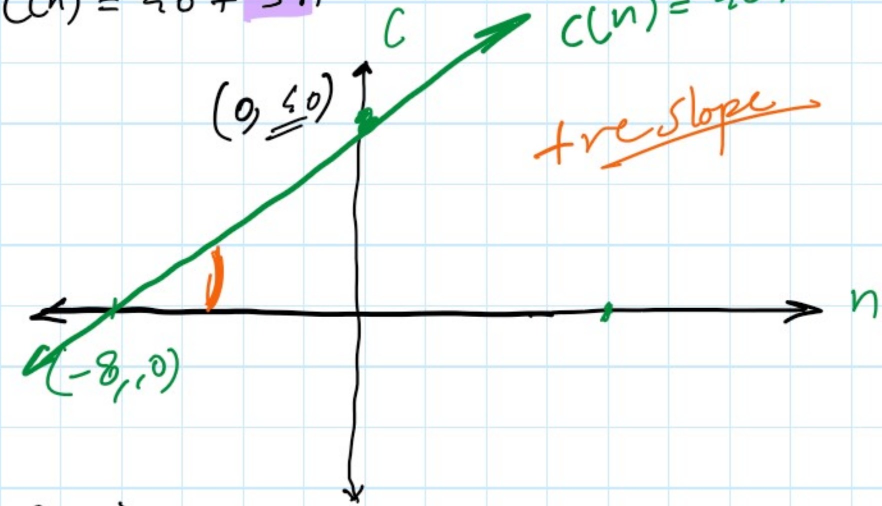
$0 < d \leq n$ where n is distance a vehicle can drive on a full tank of gas.

Draw graph of line.

a) y- intercept at $(0,-1)$ and slope of $\frac{1}{2}$



Q $\quad C(n) = 40 + 5n$



$C(n) = 0 \Rightarrow \quad 0 = 40 + 5n$

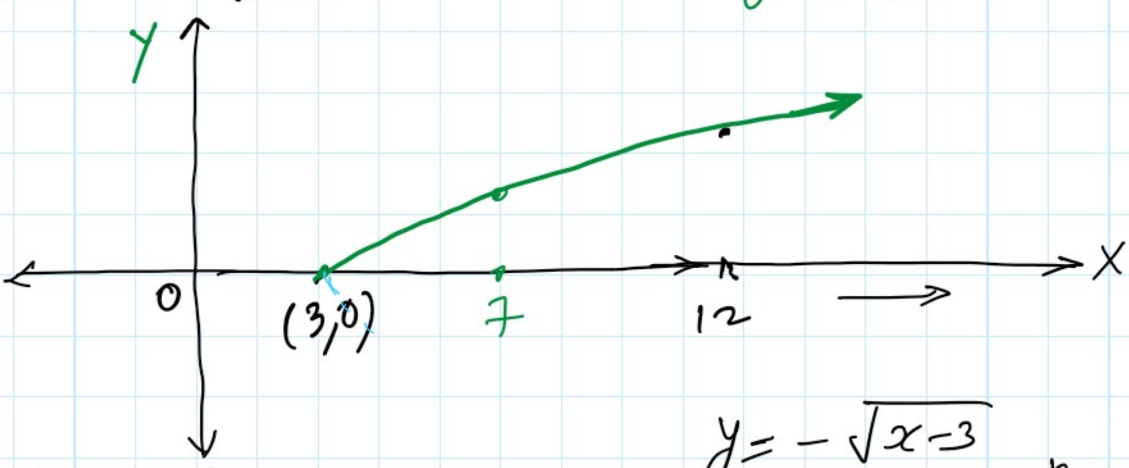
$5n = -40$

$n = -8.$

Q $\quad Y = \sqrt{x-3} \iff y^2 = x - 3$

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

Domain & Range: ?



$y = -\sqrt{x-3}$

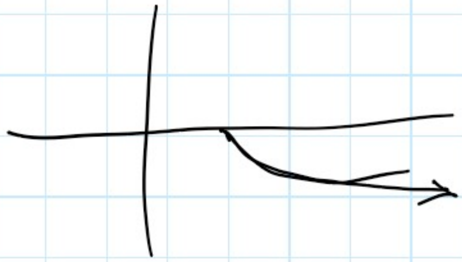
f^n

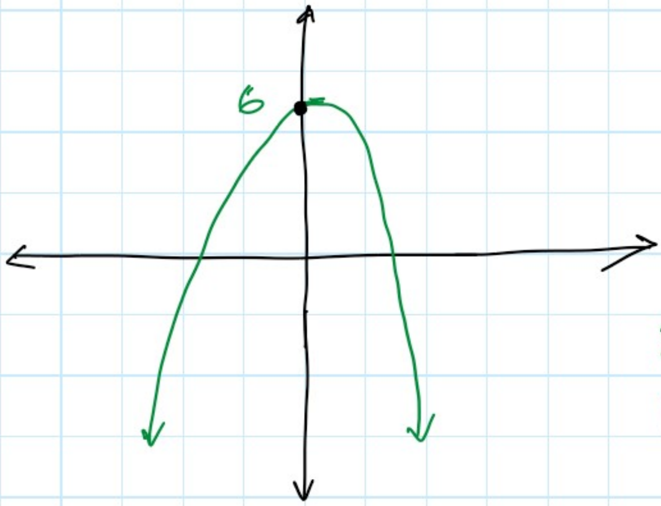
D: $x \geq 3$

$D: \boxed{x \geq 3}$

$R: \boxed{y \geq 0}$ ← Range

$y = -\sqrt{x-3}$ f^n

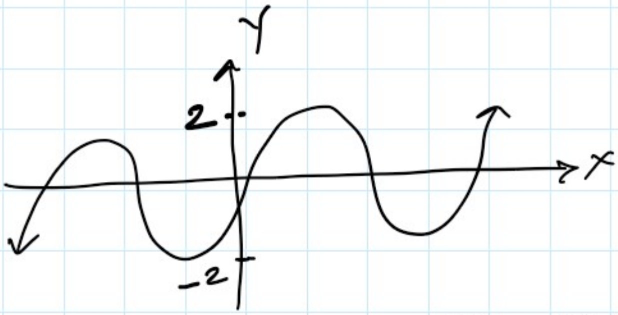




$D: \; x \in \mathbb{R}.$

$R: \; y \leq 6$

Ex



$D: \; x \in \mathbb{R}.$

$R: -2 \leq y \leq 2$

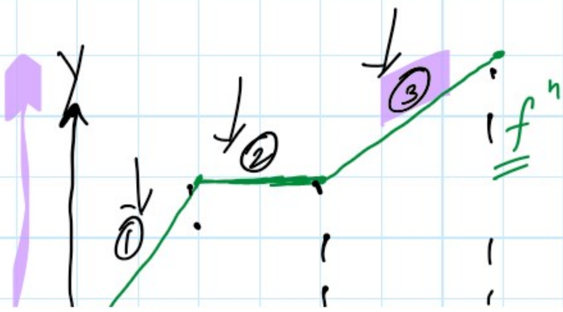
$[-2, 2]$

$[-2, 2]$

$(-2, 2) \Leftrightarrow]-2, 2[$

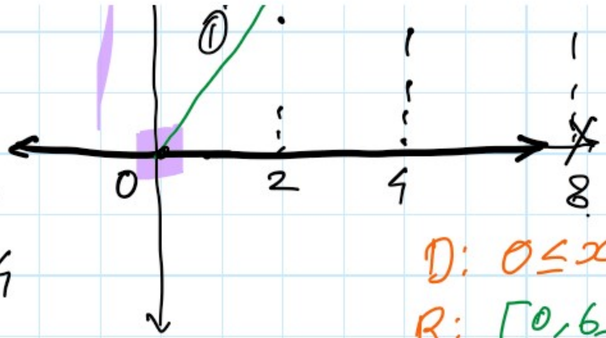
piecewise function:-

single eq^n



single eq

$$f(x) = \begin{cases} 2x & 0 \le x \le 2 \\ 4 & 2 < x \le 4 \\ \frac{1}{2}x + 2 & 4 < x \le 8. \end{cases}$$

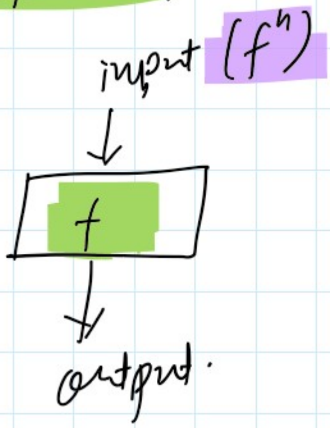


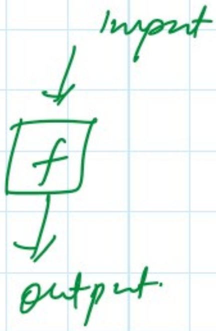
D: $0 \le x \le 8 \Leftrightarrow [0, 8]$

R: $[0, 6]$

Def^n: A piecewise function is a function that has two or more equations for different intervals of the domain of the f^n.

Composite f^n:-





$f(x) = 3x - 5$, $\quad g(x) = x^2 + 2x - 1$

$f(g(x)) \Longleftrightarrow (f \circ g)(x)$

$f(2) =$

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

$$= 3x^2 + 6x - 3 - 5$$

$$f(g(x)) = 3x^2 + 6x - 8$$

$f(x) = 3x - 5$, $\quad g(x) = x^2 + 2x - 1$, $\quad h(x) = -3$

(a) $(g \circ f)(x) = 9x^2 - 24x + 14$

(b) $f(h(x)) = -14$

(c) $f(g(-1)) = -11$

(d) $(f \circ g \circ h)(1) = 1.$

$h(1) = -3$

$(g \circ h)(1) = g(\underline{h(1)})$

$= g(-3)$

$= (-3)^2 + 2(-3) - 1$

$= 9 - 6 - 1$

$= 2$

$(f \circ g \circ h)(1) = f(\underline{g \circ h(1)})$

$= f(2)$

$= 3(2) - 5 = 1.$

Ex $\quad f(x) = \sqrt{x}$ and $g(x) = x^2 + 3x.$

Re a) $(g \circ f)(x)$ & state domain of $(g \circ f)(x)$

$= x + 3\sqrt{x}$ $\qquad x \geq 0 \quad [0, \infty)$

Re b) $(f \circ g)(x)$ —— & —— $(f \circ g)(x)$

$= \sqrt{x^2 + 3x}$ $\qquad$ D: $\cancel{x \geq 0}$

$x = -4$

$x^2 + 3x \geq 0$

$x(x+3) \geq 0$

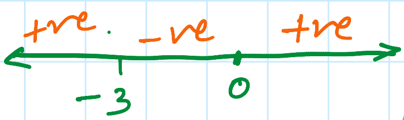
Critical points

$(f \circ g)(-4) = \sqrt{(-4)^2 + 3(-4)}$

$= \sqrt{16 - 12} = \sqrt{4} = 2$

defined.

+ve $\quad$ -ve $\quad$ +ve



$x(x+3)=0$

$x=0$, $x=-3$

for $-3<x<0$
Let $x=-1$

$(-1)(-1+3)$

$= -1(2) = -2 \geq 0$
False.

for $x>0$ Let $x=1$

$1(1+3) = \boxed{4 \geq 0}$

True.

For $x=-4$

$\boxed{\text{for } x<-3}$

$-4(-4+3)$

$= -4(-1) = +4 \geq 0$

True.

Dom: $(x \leq -3) \cup (x \geq 0)$