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19) $c(x) = -2x^2 - 10x + 4$

a) write in vertex form $(a(x-h)^2 + k)$

$= -2\left(x^2 + 5x + \frac{25}{4}\right) + 4 + \frac{25}{2}$

$-2 \cdot \frac{25}{4} = \frac{-25}{2}$, so add $\frac{25}{2}$ to cancel out.

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

$\left(\frac{5}{2}\right)^2 = \left(\frac{5}{2}\right)\left(\frac{5}{2}\right) = \frac{25}{4}$

Complete the square

$c(x) = -2\left(x + \frac{5}{2}\right)^2 + \frac{33}{2}$

b) Vertex: $\left(-\frac{5}{2}, \frac{33}{2}\right)$

c) x-ints: (x-intercepts)

Set $c(x) = 0$, then

$0 = -2\left(x + \frac{5}{2}\right)^2 + \frac{33}{2}$

$-\frac{33}{2} = -2\left(x + \frac{5}{2}\right)^2$

$\frac{33}{4} = \left(x + \frac{5}{2}\right)^2$

$\pm\frac{\sqrt{33}}{2} = x + \frac{5}{2}$

$x = \frac{-5 \pm \sqrt{33}}{2}$

$\left(\frac{-5+\sqrt{33}}{2}, 0\right)$ & $\left(\frac{-5-\sqrt{33}}{2}, 0\right)$

(finite)

g) Max or min value of $c(x)$; max of $c(x) = \frac{33}{2}$

d) y-ints:

Set all $x = 0$. Set $c(x) = y$.

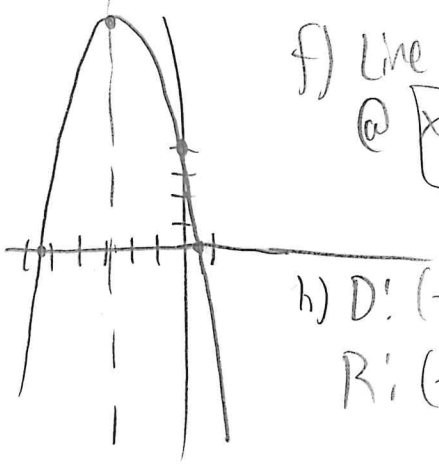
$y = -2(0^2) - 10(0) + 4$

$y = 4$

$(0, 4)$

☆ You can use either original equation or the vertex version to find x & y intercepts.

e) Sketch $c(x)$



f) Line of symmetry @ $x = \frac{-5}{2}$

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

R: $(-\infty, \frac{33}{2}]$

# ALEKS work

2/28/20

Sam has 120 meters of fencing. He will use it to form three sides of a rectangular garden. The fourth side will be along a house and will not need fencing. Find max area,

As shown below, one of the sides has length $x$ (in meters).


$-60 \div 2 = -30$

$(-30)^2 = 900$

$-2 \cdot 900 = -1800$, $1800$

$P = 2x + y$

$120 = 2x + y$

$y = -2x + 120$

$A = xy$

$A = x(-2x + 120)$

$A = -2x^2 + 120x$

$A = -2(x^2 - 60x + 900) + 1800$

$A = -2(x - 30)^2 + 1800$

vertex: $(30, 1800)$

Find max area, $A = xy$

If $x = 30$, $120 = 2(30) + y$, $y = 60$, $A = 30 \cdot 60$

$1800\ m^2$

A school wishes to enclose its rectangular playground using 480 meters of fencing.

Suppose that a side length (in meters) of the playground is $x$, as shown below.


Find max area, $A = xy$

$-240 \div 2 = -120$

$(-120)^2 = 14400$

$P = 2x + 2y$

$480 = 2x + 2y$

$2y = 480 - 2x$

$y = 240 - x$

$A = xy \rightarrow A = x(240 - x)$

$A = -x^2 + 240x$

$A = -1(x^2 - 240x + 14400) + 14400$

$A = -1(x - 120)^2 + 14400$

vertex: $(120, 14400)$

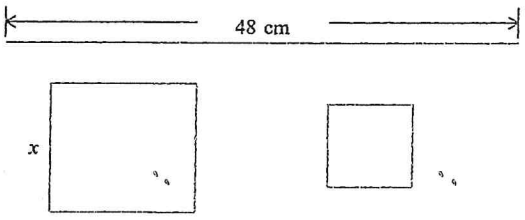
If $x = 120$, $y = 240 - x$

$= 240 - 120 = 120$

$A = xy = (120)(120) = 14400\ m^2$

A wire that is 48 centimeters long is shown below.
The wire is cut into two pieces, and each piece is bent and formed into the shape of a square.

Suppose that the side length (in centimeters) of one square is $x$, as shown below.

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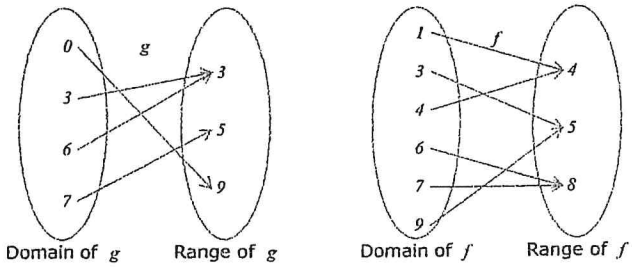
Two functions $g$ and $f$ are defined in the figure below.




Find the domain and range of the composition $f \circ g$. Write your answers in set notation.