2. $y = \frac{8}{1-x}$ at $x=3$ $\quad y - y_1 = m(x - x_1)$

Point: $y = \frac{8}{1-3}$

$y = -4$

$(3,-4)$

Slope: $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

$f(x) = \frac{8}{1-x}$ $\quad f(x+h) = \frac{8}{1-(x+h)}$

$= \frac{8}{1-x-h}$

$$\lim_{h \to 0} \frac{\frac{8}{1-x-h} - \frac{8}{1-x}}{h}$$

$$\lim_{h \to 0} \left[\frac{8(1-x) - 8(1-x-h)}{(1-x-h)(1-x)}\right] \cdot \frac{1}{h}$$

$$\lim_{h \to 0} \left[\frac{\overset{8h}{\cancel{8 - 8x - 8 + 8x + 8h}}}{(1-x-\underset{\to 0}{h})(1-x)}\right] \times \frac{1}{\cancel{h}}$$

$$m = \frac{8}{(1-x)(1-x)} = \frac{8}{(1-x)^2}$$

$\therefore$ at $x=3$ . . .

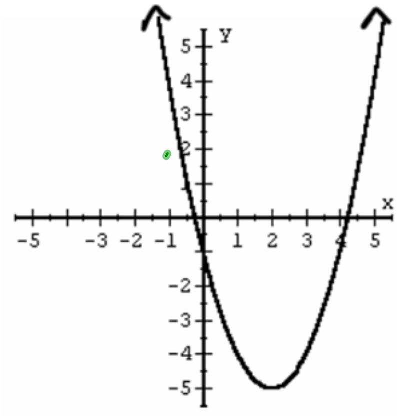
$$m = \frac{8}{(1-3)^2}$$

$m = 2$

$y + 4 = 2(x-3)$

$y + 4 = 2x - 6$

$\underline{2x - y - 10 = 0}$



$y = (x-2)^2 - 5$

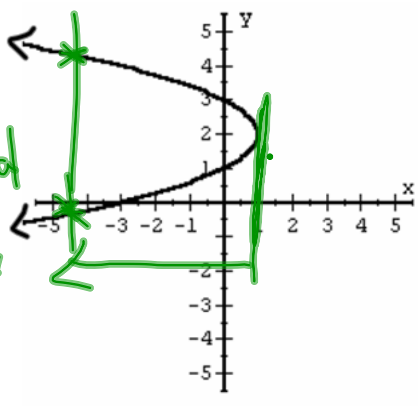
Function? yes

Domain: $\{x \in R\}$

Range:

$\{y \mid y \geq -5, y \in R\}$

Fails Vertical Line Test



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

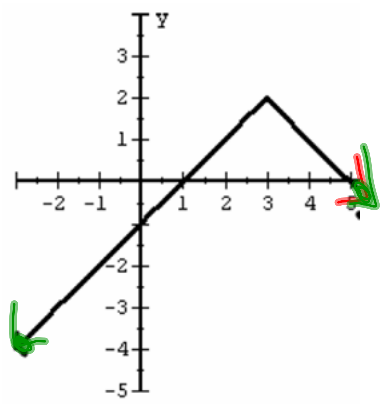
Function? No

Domain: $\{x \mid x \leq 1, x \in R\}$

Range:

$\{y \in R\}$

$\{y \mid y \in R\}$



$y = -|x-3| + 2$

Function? yes

Domain: $\{x \in R\}$

Range:

$\{y \mid y \leq 2, y \in R\}$

Using Function Notation:

When a function is represented algebraically, we are given the rule as it applies to some variable. This is called functional notation. To compute the rule applied to any input we simply replace the variable with the input.

"f" of "x"

"f" at "x"

$$
\begin{aligned}
\text{Given: } f(x) &= x^2 \text{ then} \\
f(5) &= (5)^2 = 25 \\
f(-1) &= (-1)^2 = 1 \\
f(a+b) &= (a+b)^2 = a^2 + 2ab + b^2 \\
f(2y) &= (2y)^2 = 4y^2
\end{aligned}
$$

IMPORTANT!! $\boxed{f(x) = x^2}$

This does NOT mean f multiplied by x

- Given $f(x) = x^2 + 2x - 1$, find $f(2)$.

y

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

$= 4 + 4 - 1$

$= 7$

$(2, 7)$

x	y
0	-1

- Given $f(x) = x^2 + 2x - 1$, find $f(-3)$.

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

$= 9 + {}^-6 - 1$

$= 2$

$(-3, 2)$

Given: $f(x) = -2 + 7x$ and $w(x) = x^2 - 7x + 3$

Find: $(a)\ f\left(w(-1)\right)$ $(b)\ w\left[f\left(w(0)\right)\right]$

ex.

$f(2) - w(6)$

$[-2 + 7(2)] - [(6)^2 - 7(6) + 3]$

$= 12 - (-3)$

$= 15$

2) $-3[w(-1)] + [f(0)]^2$

$w(-1) = (-1)^2 - 7(-1) + 3$

$= 1 + 7 + 3$

$= 11$

$f(0) = -2 + 7(0)$

$= -2$

$= -3(11) + (-2)^2$

$= -33 + 4$

$= -29$

$f(x)=2-x \qquad h(x)=7x+5 \qquad g(x)=2-x^2$

ex. 1) $h(1)-f(2)+g(4)$

$h(1)=7(1)+5$
$=12$

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

$g(4)=2-(4)^2$
$=-14$

$=12-0+(-14)$

$=-2$

$f(x) = 2 - x \qquad h(x) = 7x + 5 \qquad g(x) = 2 - x^2$

Evaluate: $3g(2) - h(-1)f(3) + \dfrac{h(2)}{g(1)}$

$g(2) = 2 - (2)^2$
$= 2 - 4$
$= -2$

$h(-1) = 7(-1) + 5$
$= -2$

$f(3) = 2 - 3$
$= -1$

$h(2) = 7(2) + 5$
$= 19$

$g(1) = 2 - (1)^2$
$= 1$

$= 3(-2) - (-2)(-1) + \dfrac{19}{1}$

$= -6 - 2 + 19$

$= 11$

Given: $f(x) = -2 + 7x$ and $w(x) = x^2 - 7x + 3$

Find: $(a)\ f\left(w(-1)\right)$ $\qquad$ $(b)\ w\left[\cancel{f\left(w(0)\right)}\right]$ 3 19

$w(-1) = (-1)^2 - 7(-1) + 3$

$= 1 + 7 + 3$

$= 11$

$f(11) = -2 + 7(11)$

$= -2 + 77$

$= 75$

$w(0) = 0^2 - 7(0) + 3$

$= 3$

$f(3) = -2 + 7(3)$

$= 19$

$w(19) = (19)^2 - 7(19) + 3$

$= \underline{231}$

Practice problems...

Pages 270 - 271
#4, 5, 6, 7, 8, 9, 14, 15, 17, 18, 19, 20