Week 3 Tuesday

January 22, 2019 7:51 AM

QUIZ

Intercepts of $y = 9 - x^2$

y-intercept: set $x = 0$

$y = 9$ ✓

$(0, 9)$ ✓

x-intercepts: set $y = 0$

$0 = 9 - x^2$

$x^2 = 9$

$x = \pm 3$ ✓

$(-3, 0)$ $(3, 0)$ ✓

3.1 Cont'd

Warm-up Ex: $f(x) = x^2 + x$

Find $f(x+h)$

$f(x+h) = (x+h)^2 + x + h$ ✓

$= x^2 + 2xh + h^2 + x + h$ ✓

Ex: $f(x) = \sqrt{x-1}$

Simplify $\dfrac{f(x+h) - f(x)}{h}$

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

$$= \frac{\left(\sqrt{x+h-1} - \sqrt{x-1}\right)}{h} \cdot \frac{\left(\sqrt{x+h-1} + \sqrt{x-1}\right)}{\left(\sqrt{x+h-1} + \sqrt{x-1}\right)}$$

"conjugate radical"

ASIDE

$f(x)+h = \sqrt{x-1}+h$

$f(7) = \sqrt{7-1}$

$f(11) = \sqrt{11-1}$

$f(x+h) = \sqrt{x+h-1}$

ASIDE

$\sqrt{87}\sqrt{87} = 87$

$$= \frac{\sqrt{x+h-1}\sqrt{x+h-1} + \sqrt{x+h-1}\sqrt{x-1} - \sqrt{x-1}\sqrt{x+h-1} - \sqrt{x-1}\sqrt{x-1}}{h\left(\sqrt{x+h-1} + \sqrt{x-1}\right)}$$

$$= \frac{x+h-1-(x-1)}{h\left(\sqrt{x+h-1} + \sqrt{x-1}\right)}$$

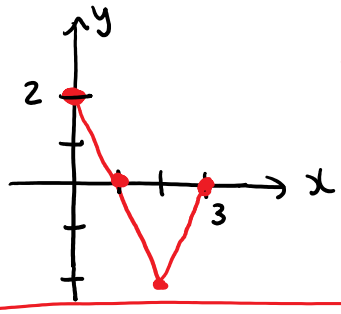
$$= \frac{\cancel{h}\,1}{\cancel{h}\left(\sqrt{x+h-1} + \sqrt{x-1}\right)}$$

$$= \frac{1}{\sqrt{x+h-1} + \sqrt{x-1}}$$

Don't rationalize when there are variables under $\sqrt{}$

3.2 The Graph of a Function

Ex:



$y = f(x)$

$f(x)$ is the y-value associated with x

$f(x)$ is the y-value associated with x

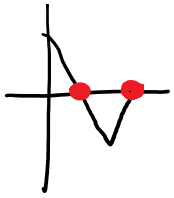
a) Is $(2, -1)$ on graph [of $f(x)$]?

No

b) Find $f(2)$

y-value associated with $x=2$

-2

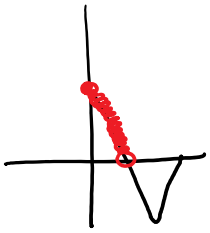


c) For which x is $f(x)=0$?

$1, 3$

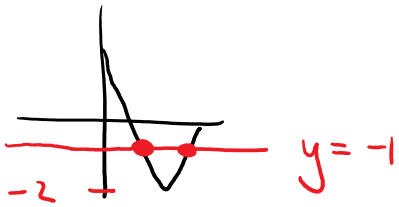
d) For which x is $f(x) > 0$?

$0 \leq x < 1$



e) How often does $y=-1$ intersect the graph?

twice



Ex: $f(x) = \frac{x-2}{x+8}$

a) Is $(3, \frac{1}{11})$ on the graph?

Sub $x=3$

$f(3) = \frac{1}{11}$ ✓

YES

b) If $x=4$, what is $f(x)$?

$f(4) = \frac{2}{12}$ or $\frac{1}{6}$

c) If $y = -9$, what is x?

Sub $f(x) = -9$:

$$-9 = \frac{x-2}{x+8}$$

$$-9(x+8) = x-2$$

$$-9x - 72 = x - 2$$

$$-70 = 10x$$

$$-7 = x$$

$$x = -7$$

d) Find the y-intercept (set $x = 0$)

$$f(x) = \frac{x-2}{x+8}$$

$$f(0) = \frac{-2}{8} = \frac{-1}{4}$$

$$\left(0, -\frac{1}{4}\right)$$

e) x-intercepts ? (set $y = 0$) (set $f(x) = 0$)

$$0 = \frac{x-2}{x+8}$$

$$0 = x - 2$$

$$x = 2$$

$$(2, 0)$$