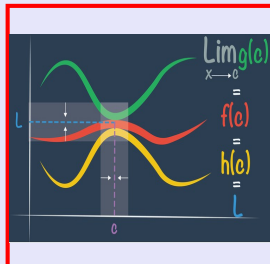# Math 261

Spring 2023

Lecture 3

Feb 19-8:47 AM

Equation of a Circle:

$$(x - h)^2 + (y - k)^2 = r^2$$

Center (h, k), Radius r

$r^2 = 9$
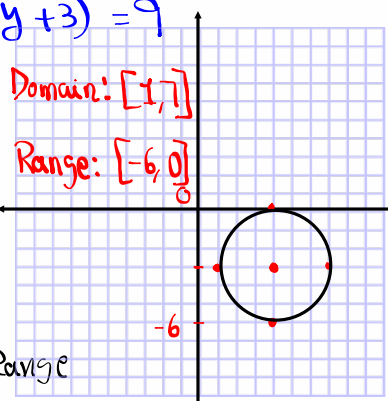
$r = 3$

Given $(x - 4)^2 + (y + 3)^2 = 9$

1) Center $(4, -3)$

2) Radius 3

3) Graph it

4) Discuss Domain & Range
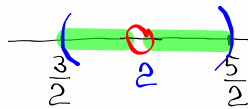
5) Discuss intercepts

Domain: $[1, 7]$

Range: $[-6, 0]$

x-Ints $(4, 0)$

Y-Int None

Feb 8-8:51 AM

Solve & Graph

$$\frac{3}{|x-2|} > 6$$

$x - 2 \neq 0$
$x \neq 2$

$$\frac{|x-2|}{3} < \frac{1}{6}$$

$$2|x-2| < 1$$

$$|x-2| < \frac{1}{2}$$

LCD = 6

$$-\frac{1}{2} < x-2 < \frac{1}{2}$$

$$2 - \frac{1}{2} < x < 2 + \frac{1}{2}$$

$$\boxed{\frac{3}{2} < x < \frac{5}{2}}$$ → Not Correct

$\frac{3}{2}$ 2 $\frac{5}{2}$

$$\left(\frac{3}{2}, 2\right) \text{ OR } \left(2, \frac{5}{2}\right)$$

$\frac{3}{2}$ 2 $\frac{5}{2}$

Feb 8-8:57 AM

If $|x+2| < 2$, find max. value for $|3x-2|$.

$$|x+2| < 2 \Rightarrow -2 < x+2 < 2$$
$$-4 < x < 0$$

what about $3x$? $-12 < 3x < 0$

what about $3x-2$? $-14 < 3x-2 < -2$

Do you agree that $-2 < 14$? Yes

$$-14 < 3x - 2 < -2 < 14$$

$|x| < K$
$-K < x < K$

$$-14 < 3x - 2 < 14$$

$$|3x-2| < 14$$

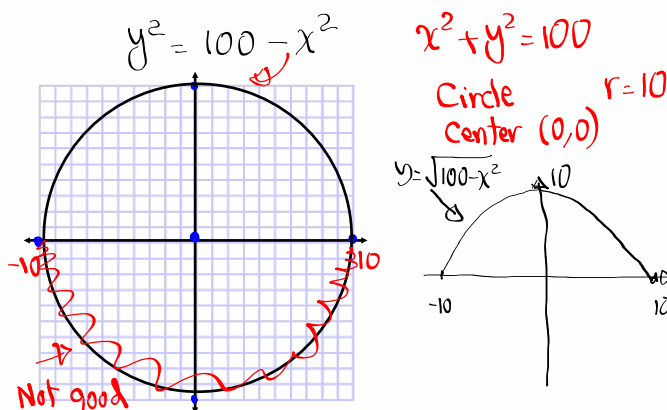$|3x-2| < 14 \Rightarrow$ below 14.

Feb 8-9:04 AM

Given $y = \sqrt{100 - x^2}$ $y \geq 0$

Y-Int $\rightarrow x = 0$ $\rightarrow y = \sqrt{100 - 0^2} = \sqrt{100} = 10 \rightarrow (0, 10)$
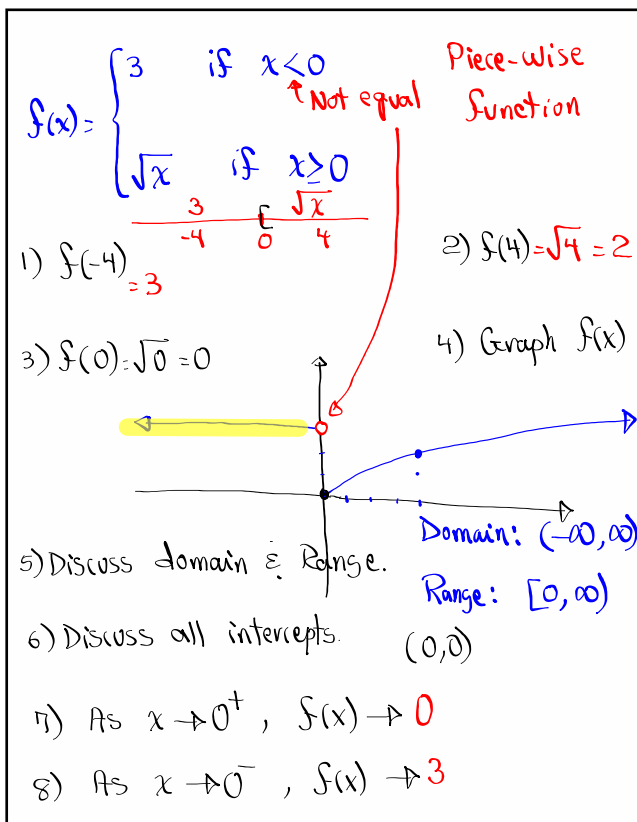
X-Ints $\rightarrow y = 0$ $\rightarrow 0 = \sqrt{100 - x^2} \rightarrow x = \pm 10 \rightarrow (\pm 10, 0)$

Graph
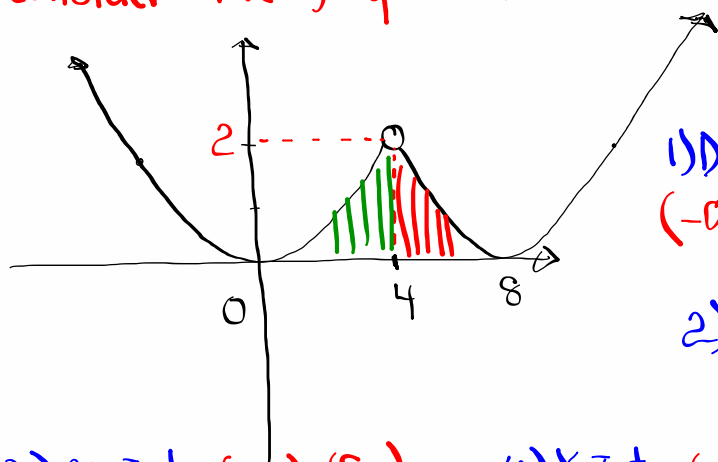
How do I remove the radical? Square both sides

$y^2 = 100 - x^2$ $x^2 + y^2 = 100$

Circle
Center (0,0) $r = 10$

$y = \sqrt{100 - x^2}$ 10

-10   10

-10   10

Not good

Feb 8-9:11 AM

$f(x) = \begin{cases} 3 & \text{if } x < 0 \\ \sqrt{x} & \text{if } x \geq 0 \end{cases}$ Piece-wise Function

↑ Not equal

$\begin{array}{c} 3 \\ -4 \end{array}$ E $\begin{array}{c} \sqrt{x} \\ 4 \end{array}$ 0

1) $f(-4) = 3$

2) $f(4) = \sqrt{4} = 2$

3) $f(0) = \sqrt{0} = 0$

4) Graph $f(x)$

5) Discuss domain & Range.

6) Discuss all intercepts.   (0,0)

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

Range: $[0, \infty)$

7) As $x \rightarrow 0^+$, $f(x) \rightarrow 0$

8) As $x \rightarrow 0^-$, $f(x) \rightarrow 3$

Feb 8-9:18 AM

Consider the graph below

1) Domain
$(-\infty, 4) \cup (4, \infty)$

2) Range
$[0, \infty)$

3) x-Int $(0,0), (8,0)$ 4) Y-Int $(0,0)$

5) As $x \to 4^+$, $y \to 2$

6) As $x \to 4^-$, $y \to 2$

Feb 8-9:32 AM