

MA 109: September 5

Inverse Functions

Start of Class

Instructor Information

Name:

Email:

Office Hours:

Warm-up Questions

Notes

Example: Suppose $f(x) = \frac{2x-1}{3x+5}$. What is $f^{-1}(-7)$?

input to inverse
↓

↑
"f inverse of -7"

Strategy: inverse functions swap inputs and outputs, so
-7 is the output to $f(x)$.

$$(3x+5)(-7) = \frac{2x-1}{3x+5} (3x+5)$$

$$\underbrace{-7(3x+5)} = 2x-1$$

$$\begin{array}{r} -21x - 35 = 2x - 1 \\ +21x \qquad +21x \end{array}$$

$$\begin{array}{r} -35 = 23x - 1 \\ +1 \qquad +1 \end{array}$$

$$\frac{-34}{23} = \frac{23x}{23}$$

$$\boxed{\frac{-34}{23}} = x$$

Example: Suppose $f(x) = \frac{2x-1}{3x+5}$. What is $f^{-1}(x)$?

remember: inverse functions swap inputs (x) and outputs (y)

Strategy: ① write $y = f(x)$
② swap x and y
③ solve for y

$$\textcircled{1} \quad y = \frac{2x-1}{3x+5}$$

$$\textcircled{2} \quad x = \frac{2y-1}{3y+5}$$

$$\textcircled{3} \quad (3y+5)x = \frac{2y-1}{3y+5} (3y+5)$$

$$(3y+5)x = 2y-1$$

$$3xy + 5x = 2y - 1$$

$$3xy - 2y + 5x = -1$$

$$y(3x-2) + 5x = -1$$

$$\frac{y(3x-2)}{3x-2} = \frac{-1-5x}{3x-2}$$

get all y's on same side of =

answer:

$$f^{-1}(x) = \frac{-1-5x}{3x-2}$$

End of Class

Write a summary of what you learned today:

What questions do you have about the material from today?

What do you need to do between now and the next class meeting?