Indicate which group member is taking on which of the following four roles. You will switch roles on the next recitation day.

- Reader: Reads the problem to the group and makes sure everyone understands.

- Spokesperson: presents the work and asks questions to the TA.

- Recorder: writes everyone's names and the group's work on the worksheet.

- Timekeeper: keeps track of time.

Reader's name: _____

Spokesperson's name: _____

Recorder's name: _____

Timekeeper's name: _____

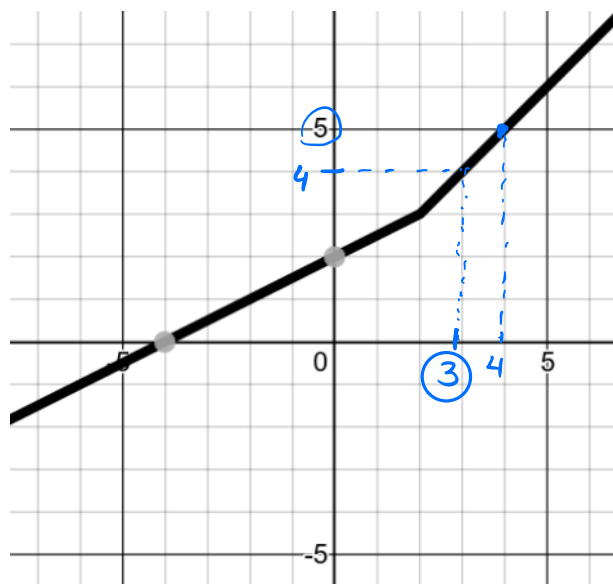1. Suppose $f(x)$ is given by the graph to the right.

   (a) What is $f(4)$?

   $f(4) = 5$

   (b) Solve $f(x) = 4$.

   $\underline{x = 3}$ so that $f(3) = 4$

   (c) What is $f^{-1}(4)$?

   From b), $f(3) = 4$, so $f^{-1}(4) = \underline{3}$

2. Let let $h(x)$ be defined by the table to the right.

   (a) What is $h(3)$?

   $h(3) = 2$

   (b) What is $h^{-1}(3)$?

   $h(-1) = 3 \Rightarrow h^{-1}(3) = -1$

   (c) What is $h(h^{-1}(3))$?

   $h(h^{-1}(3)) = h(-1) = 3$ or $h(h^{-1}(3)) = 3$

   inverse of each other

x	h(x)
-1	3
0	1
1	-1
2	0
3	2
4	4

3. Let $f(x) = 2x - 5$. Find $f^{-1}(7)$.

$x = 2y - 5 \implies x + 5 = 2y \implies y = \frac{x+5}{2}$, so $f^{-1}(x) = \frac{x+5}{2}$

$f^{-1}(7) = (7+5)/2 = 12/2 = 6$

4. Let $g(x) = \dfrac{2x - 3}{5x + 4}$. Find:

(a) $g^{-1}(5)$ finding directly

$g(x) = 5 = \frac{2x-3}{5x+4} \implies 5(5x+4) = 2x - 3$

$\implies 25x + 20 = 2x - 3$

$\implies 23x = -23 \implies x = -1$

Solve   (b) $g^{-1}(x)$ $\overset{\shortparallel}{g^{-1}(5)}$

for "y" $\searrow$ $x = \frac{2y-3}{5y+4} \implies x(5y+4) = 2y - 3$

$\implies 5xy + 4x = 2y - 3$

$\implies 4x + 3 = 2y - 5xy = y(2 - 5x)$

5. Let $h(x) = \dfrac{2x}{x - 3}$. $\implies y = g^{-1}(x) = \dfrac{2 - 5x}{4x + 3}$

(a) $h^{-1}(-1)$

$h(x) = 1 = \frac{2x}{x-3} \implies x - 3 = 2x \implies x = -3$

                                                 $\overset{\shortparallel}{h^{-1}(-1)}$

(b) $h^{-1}(x)$

$x = \frac{2y}{y-3} \implies x(y-3) = 2y \implies xy - 3x = 2y$

$\implies xy - 2y = 3x \implies y(x-2) = 3x \implies y = \dfrac{3x}{x-2}$

6. The work below shows the process of finding $f^{-1}(x)$ for $f(x) = \dfrac{2x+1}{3x-5}$. Answer the questions below about the process.

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

(a) ②③ $\qquad x(3y+5) = 2y-1 \tag{2}$

$\qquad\qquad 3xy + 5x = 2y - 1 \tag{3}$

(b) ④⑤ $\qquad 3xy - 2y + 5x = -1 \tag{4}$

$\qquad\qquad 3xy - 2y = -5x - 1 \tag{5}$

(c) ⑥ $\qquad y(3x-2) = -5x - 1 \tag{6}$

$$y = \frac{-5x-1}{3x-2} \tag{7}$$

(a) What happened between lines (2) and (3)?

distributing "x" to each term on the left

(b) Between lines (4) and (5), why did they move the $5x$, not the $3xy$?

Grouping terms containing "y" and the ones that do not contain "y" on opposite sides of the equality.

(c) What happened between lines (5) and (6)?

factoring out "y" on the left since it is a common factor.