

PRE-AP ALGEBRA 2

- 1) For $y = f(x) = \frac{3-5x}{7-9x}$, calculate $y = f^{-1}(x)$.

$$x = \frac{3-5y}{7-9y}, \quad x(7-9y) = 3-5y,$$

$$7x - 9xy = 3 - 5y, \quad 5y - 9xy = 3 - 7x,$$

$$y(5-9x) = 3-7x,$$

$$y = f^{-1}(x) = \frac{3-7x}{5-9x}$$

$$\begin{aligned} & \frac{3(5-9x) - 5(3-7x)}{5-9x} \\ &= \frac{15-27x-15+35x}{5-9x} = \frac{8x}{5-9x} \end{aligned}$$

$$\begin{aligned} (b) \quad f^{-1}(f) &= \frac{3\left(\frac{7-9x}{7-9x}\right) - 7\left(\frac{3-5x}{7-9x}\right)}{5\left(\frac{7-9x}{7-9x}\right) - 9\left(\frac{3-5x}{7-9x}\right)} = \frac{3-7x}{5-9x} = \frac{3(7-9x) - 7(3-5x)}{5(7-9x) - 9(3-5x)} \\ &= \frac{21-27x-21+35x}{35-45x-27+45x} = \frac{8x}{8} = x \end{aligned}$$

2B.3 CLASSWORK

- 2) For $y = f(x)$ and $y = f^{-1}(x)$ from problem 1, verify that

a) $f(f^{-1}(x)) = x$

b) $f^{-1}(f(x)) = x$

$$(a) \quad f(f^{-1}) = \frac{3-5f^{-1}}{7-9f^{-1}} =$$

$$\begin{aligned} &= \frac{3\left(\frac{5-9x}{5-9x}\right) - 5\left(\frac{3-7x}{5-9x}\right)}{7\left(\frac{5-9x}{5-9x}\right) - 9\left(\frac{3-7x}{5-9x}\right)} = \\ &= \frac{15-27x-15+35x}{35-63x-27+63x} = \frac{8x}{8} = x \end{aligned}$$