

Given a Point the Line Passes Through and a Line it is Parallel to

1. Find the slope of the given line, and use this to get the slope of the new line - they have the same slope
2. Use this new slope and the given point to plug into the equation $y - y_1 = m(x - x_1)$, and solve this for y to get it into the form $y = mx + b$

✓ Ex) Find the equation of the line that passes through the point (1, 7) and is parallel to $y - 3x = 5$

$$\textcircled{1} y - 3x = 5 \rightarrow y = 3x + 5$$

$$m = 3$$

$$\textcircled{2} y - y_1 = m(x - x_1)$$

$$y - 7 = 3(x - 1)$$

$$y - 7 = 3x - 3$$

$$y = 3x + 4$$

✓ Ex) Find the equation of the line that passes through the point (5, 9) and is parallel to $y - 4x = 3$

$$\textcircled{1} y - 4x = 3 \rightarrow y = 4x + 3$$

$$m = 4$$

$$\textcircled{2} y - y_1 = m(x - x_1)$$

$$y - 9 = 4(x - 5)$$

$$y - 9 = 4x - 20$$

$$y = 4x - 11$$

Operations on Functions

$$(f + g)(x) = f(x) + g(x)$$

$$(f - g)(x) = f(x) - g(x)$$

$$(fg)(x) = f(x) \cdot g(x)$$

$$(f \circ g)(x) = f(g(x))$$

$$(g \circ f)(x) = g(f(x))$$

$$(f \circ f^{-1})(x) = f(f^{-1}(x))$$

$f^{-1}(x)$ [the inverse of $f(x)$] is obtained by:

1. Replace $f(x)$ with y
2. Solve the equation for x
3. Switch x and y
4. Replace y with f^{-1}

Ex) Given $f(x) = 3x + 2$ and $g(x) = 4 - 5x$ find the following.

✓ a) $(f + g)(x)$

$$3x + 2 + 4 - 5x$$

$$-2x + 6$$

✓ b) $(f - g)(x)$

$$3x + 2 - (4 - 5x)$$

$$3x + 2 - 4 + 5x$$

$$8x - 2$$

✓ c) $(fg)(x)$

$$(3x + 2)(4 - 5x)$$

$$12x - 15x^2 + 8 - 10x$$

$$-15x^2 + 2x + 8$$