JIT 13.1: Solving Linear Equations Involving Derivatives

Recall that for a function $f(x)$, we can denote the derivative as $\frac{df}{dx}$.

Example. Solve the following for $\frac{dy}{dx}$:

$2 + 3\frac{dy}{dx} = 1$

$3\frac{dy}{dx} = -1$

$\frac{dy}{dx} = -\frac{1}{3}$

$2x + 3y' = 3x - 5y'$

$8y' = x$

$y' = \frac{1}{8}x$

$x + 2y\frac{dy}{dx} = -\frac{dy}{dx} + y$

$2y\frac{dy}{dx} - \frac{dy}{dx} = y - x$

$\frac{dy}{dx}(2y - 1) = y - x$

$\frac{dy}{dx} = \frac{y - x}{2y - 1}$

$5xy + 4\frac{dy}{dx} = 3x^2 - 2xy^2\frac{dy}{dx}$

$4\frac{dy}{dx} + 2xy^2\frac{dy}{dx} = 3x^2 - 5xy$

$\frac{dy}{dx}(4 + 2xy^2) = 3x - 5xy$

$\frac{dy}{dx} = \frac{3x - 5xy}{4 + 2xy^2}$