Exercise 10

Find dy/dx by implicit differentiation.

$$xe^y = x - y$$

Solution

Differentiate both sides with respect to x.

$$\frac{d}{dx}(xe^y) = \frac{d}{dx}(x - y)$$

$$\left[\frac{d}{dx}(x)\right] e^y + x\left[\frac{d}{dx}(e^y)\right] = \frac{d}{dx}(x) - \frac{d}{dx}(y)$$

$$(1)e^y + x\left[e^y \cdot \frac{d}{dx}(y)\right] = 1 - y'$$

$$e^y + xe^y y' = 1 - y'$$

Solve for y'.

$$(1 + xe^y)y' = 1 - e^y$$

$$y' = \frac{1 - e^y}{1 + xe^y}$$