

1. Find  $\frac{d^2y}{dx^2}\bigg|_{(x,y)=(2,1)}$  if  $y$  is a differentiable function of  $x$  satisfying the equation  $1 + \ln(2x - 3y) = x^2 - 3y^2$ .

$$\frac{1}{2x-3y} \cdot (2-3y') = 2x-6yy'$$

$\downarrow (x,y) = (2,1)$

$$2-3y' = 4-6y' \Rightarrow y' = \frac{2}{3} \text{ at } (x,y) = (2,1)$$

$$-\frac{1}{(2x-3y)^2} \cdot (2-3y')^2 + \frac{1}{2x-3y} \cdot (-3y'') = 2 - 6y'y' - 6yy''$$

$\downarrow (x,y) = (2,1), y' = \frac{2}{3}$

$$-3y'' = 2 - 6 \cdot \left(\frac{2}{3}\right)^2 - 6y''$$

$$y'' = -\frac{2}{9} \text{ at } (x,y) = (2,1)$$