

$$\text{let } f(x, y) = 9x^2 + y^2 - xy - 13x$$

$$a) \frac{df}{dx} = 8x + 0 - y - 13$$

$$\boxed{f'(x, y) = 8x - y - 13}$$

$$\frac{df}{dy} = 0 + 2y - x - 0$$

$$\boxed{\frac{df}{dy} = 2y - x}$$

$$b) 8x - y - 13 = 0$$

$$8x - y = 13$$

$$\begin{aligned} 2y - x &= 0 \\ 2y &= x \end{aligned} \quad \text{Plug in}$$

$$8(2y) - y = 13$$

$$16y - y = 13$$

$$\cancel{\frac{15}{15}y = \frac{13}{15}}$$

$$y = \frac{13}{15}$$

$$x = 2\left(\frac{13}{15}\right)$$

$$(x, y) = \left(\frac{26}{15}, \frac{13}{15}\right)$$

$$x = \frac{26}{15}$$