

$$9. f(x,y) = \frac{x^2 - y}{2y+3} \quad (1,2)$$

$$f(x,y) = \frac{1}{2y+3} (x^2 - y)$$

$$\begin{aligned} \nabla f(x,y) &= f_x \vec{i} + f_y \vec{j} \\ &= \frac{\partial x}{\partial y+3} \vec{i} + \frac{-3-2x^2}{(2y+3)^2} \vec{j} \end{aligned}$$

$$\begin{aligned} \nabla f(1,2) &= \frac{\partial(1)}{\partial(2)+3} \vec{i} + \frac{-3-2(1)^2}{(2 \cdot 2+3)^2} \vec{j} \\ &= \frac{2}{7} \vec{i} + \frac{-5}{49} \vec{j} \end{aligned}$$

$$\begin{aligned} \|\nabla f(1,2)\| &= \sqrt{\left(\frac{2}{7}\right)^2 + \left(\frac{-5}{49}\right)^2} \\ &= \sqrt{\left(\frac{14}{49}\right)^2 + \left(\frac{-5}{49}\right)^2} \\ &= \sqrt{\frac{14^2}{49^2} + \frac{(-5)^2}{49^2}} \\ &= \sqrt{\frac{196}{49^2} + \frac{25}{49^2}} \\ &= \sqrt{\frac{221}{49^2}} \\ &= \frac{\sqrt{221}}{\sqrt{49^2}} \\ &= \frac{\sqrt{221}}{49} \end{aligned}$$

QUOTIENT RULE

$$P' = -1 \quad Q' = 2$$

$$\frac{P'Q - PQ'}{Q^2}$$

$$\frac{-1(2y+3) - (x^2-y)2}{(2y+3)^2}$$

$$\frac{-2y-3-2x^2+2y}{(2y+3)^2}$$

$$\frac{-3-2x^2}{(2y+3)^2}$$