WRITE YOUR NAME:

MAC 2313 Quiz 11
Thursday February 22nd

Find the directional derivative of $f(x,y) = x^2 + xy + y^2$ at the point $(3,1)$ in the direction of $\mathbf{u} = (\frac{3}{5}, -\frac{4}{5})$. ← this is a unit vector

$$f_x = 2x + 1\cdot y + 0 = 2x + y$$

$$f_y = 0 + x\cdot 1 + 2y = x + 2y$$

$$\nabla f = \nabla f(x,y) = (2x+y, x+2y)$$

$$\nabla f(3,1) = (2\cdot 3 + 1, 3 + 2\cdot 1) = (7,5)$$

$$D_{\vec{u}} f(3,1) = \nabla f(3,1) \cdot \vec{u}$$

$$= (7,5)\cdot\left(\frac{3}{5}, \frac{-4}{5}\right)$$

$$= \frac{21}{5} - \frac{20}{5} = \boxed{\frac{1}{5}}$$