$f(x, y) = 2x \sin(xy) \implies$
$f_x(x, y) = 2x \cos(xy) \cdot y + 2 \sin(xy) = 2xy \cos(xy) + 2 \sin(xy)$ and $f_y(x, y) = 2x \cos(xy) \cdot x = 2x^2 \cos(xy)$. If $\mathbf{u}$ is a unit vector in the direction of $\theta = \frac{\pi}{6}$, then from equation
$D_{\mathbf{u}} f(x, y) = f_x(x, y) \cos \theta + f_y(x, y) \sin \theta,$
$D_{\mathbf{u}} f(5, 0) = f_x(5, 0) \cos \frac{\pi}{6} + f_y(5, 0) \sin \frac{\pi}{6} = 0 + 50\left(\frac{1}{2}\right) = 25.$