

Name	ID	Grade/10
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Find the derivative of the function  $f(x, y) = 2xy - 3y^2$  at  $P_0(5, 5)$  in the direction of  $A = 4i + 3j$

✓

$$|A| = 5 \quad \vec{u} = \frac{4}{5}\vec{i} + \frac{3}{5}\vec{j}$$

$$D_{\vec{u}}f|_{P_0} = \nabla f|_{P_0} \cdot \vec{u}$$

$$\nabla f|_{P_0} = \left. \frac{\partial f}{\partial x} \right|_{P_0} \vec{i} + \left. \frac{\partial f}{\partial y} \right|_{P_0} \vec{j} = 10\vec{i} - 20\vec{j}$$

$$D_{\vec{u}}f|_{P_0} = (10\vec{i} - 20\vec{j}) \cdot \left( \frac{4}{5}\vec{i} + \frac{3}{5}\vec{j} \right) = -4 \quad \checkmark$$

✓ 14.16 Find an equation for the tangent plane to  $z = \sqrt{y-x}$  at the point  $(1, 2, 1)$

~~$z = \sqrt{y-x}$~~   $\sqrt{y-x} - z = 0$

~~$\nabla f|_{P_0}$~~   $\nabla f = -\frac{1}{2}\vec{i} + \frac{1}{2}\vec{j} - \vec{k}$

~~$\frac{\partial f}{\partial x}$~~   $\nabla f = -\frac{1}{2}\vec{i} + \frac{1}{2}\vec{j} - \vec{k}$

$$-\frac{1}{2}(x-1) + \frac{1}{2}(y-2) - (z-1) = 0$$

$$-\frac{1}{2}x + \frac{1}{2} + \frac{1}{2}y - 1 - z + 1 = 0$$

$$-\frac{1}{2}x + \frac{1}{2}y - z + \frac{1}{2} = 0$$

$$-\frac{1}{2}x + \frac{1}{2}y - z = -\frac{1}{2}$$

eq of tangent plane to  $z = \sqrt{y-x}$

$$z = \frac{1}{2}(-x + y + 1)$$