QUIZ 8 | 5-6 pm

Solutions

① Find $\frac{\partial w}{\partial u}$

$w = xy + \ln z$, $x = \frac{v^2}{u}$, $y = u+v$, $z = \cos u$

$$\frac{\partial w}{\partial u} = \frac{\partial w}{\partial x}\frac{\partial x}{\partial u} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial u} + \frac{\partial w}{\partial z}\frac{\partial z}{\partial u}$$

$$= y \cdot \frac{-v^2}{u^2} + x \cdot 1 + \frac{1}{z}(-\sin u)$$

$$= -(u+v)\left(\frac{v^2}{u^2}\right) + \frac{v^2}{u} - \frac{\sin u}{\cos u}$$

$$= -\frac{(u+v)v^2}{u^2} + \frac{v^2}{u} - \tan u$$

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② Find the derivative of the function P_0 in the direction A

$f(x,y) = x^2 + 2y^2$, $P_0(-1,1)$, $\bar{A} = 3i - 4j$

$$u = \frac{\bar{A}}{\|\bar{A}\|} = \frac{(3,-4)}{\sqrt{9+16}} = \left(\frac{3}{5}, -\frac{4}{5}\right) = \frac{1}{5}(3,-4)$$

$$D_u f|_{P_0} = \nabla f|_{P_0} \cdot u = (2x, 4y)|_{P_0} \cdot \left(\frac{3}{5}, -\frac{4}{5}\right)$$

$$= \frac{1}{5}(-2,4) \cdot (3,-4) = \frac{1}{5}(-6 - 16)$$

$$= \frac{-22}{5}$$