

נתון כי $w = f(x, y)$ וכן נתון כי בקורדינטות

פולריות: $x = r \cos \theta$ ו $y = r \sin \theta$

מצא את f_y במונחים של $\frac{\partial w}{\partial r}$ ו $\frac{\partial w}{\partial \theta}$

תשובת:

יש לבחור תשובה אחת:

$f_y = \frac{\partial w}{\partial r} \cdot \sin \theta - \frac{\cos \theta}{r} \frac{\partial w}{\partial \theta}$.a

$f_y = \frac{\partial w}{\partial r} \frac{\cos \theta}{r} + \sin \theta \frac{\partial w}{\partial \theta}$.b

$f_y = \frac{\partial w}{\partial r} \cdot \cos \theta + \frac{\sin \theta}{r} \frac{\partial w}{\partial \theta}$.c

$f_y = \frac{\partial w}{\partial r} \cdot \sin \theta + \frac{\cos \theta}{r} \frac{\partial w}{\partial \theta}$.d

$$\frac{\partial f}{\partial r} = \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial r} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial r} = f_x \cdot \cos \theta + f_y \cdot \sin \theta \Rightarrow f_x = \frac{1}{\cos \theta} \left[\frac{\partial w}{\partial r} - f_y \cdot \sin \theta \right]$$

$$\frac{\partial f}{\partial \theta} = \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial \theta} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial \theta} = -f_x \cdot r \sin \theta + f_y \cdot r \cos \theta$$

$$\frac{\partial w}{\partial \theta} = \frac{1}{\cos \theta} \left[f_y \cdot \sin \theta - \frac{\partial w}{\partial r} \right] \cdot r \sin \theta + f_y \cdot r \cos \theta$$

$$\frac{\partial w}{\partial \theta} = r \tan \theta \left[f_y \cdot \sin \theta - \frac{\partial w}{\partial r} \right] + f_y \cdot r \cos \theta$$

$$\frac{\partial w}{\partial \theta} = f_y \cdot r \sin \theta \tan \theta - \frac{\partial w}{\partial r} r \tan \theta + f_y \cdot r \cos \theta$$

$$\frac{\partial w}{\partial \theta} + \frac{\partial w}{\partial r} r \tan \theta = f_y r [\sin \theta \tan \theta + \cos \theta]$$

$$\frac{1}{r} \frac{\partial w}{\partial \theta} + \frac{\partial w}{\partial r} \tan \theta = f_y [\sin \theta \tan \theta + \cos \theta] \quad / \cdot \cos \theta$$

$$\frac{\cos \theta}{r} \frac{\partial w}{\partial \theta} + \frac{\partial w}{\partial r} \sin \theta = f_y [\sin \theta \sin \theta + \cos \theta \cos \theta]$$

$$f_y = \frac{\cos \theta}{r} \frac{\partial w}{\partial \theta} + \frac{\partial w}{\partial r} \sin \theta$$