

TP2

(21b) $h(\rho, \phi, \theta) = \rho \sin \phi \cos \theta$

$h_\rho = \sin \phi \cos \theta$

$h_\phi = \rho \cos \phi \cos \theta$

$h_\theta = -\rho \sin \phi \sin \theta$

(24) $f(x, y, z) = e^{(3x+4y)} \cos(5z)$

$f_{xx} + f_{yy} + f_{zz} = 0$

$f_x = 3 e^{(3x+4y)} \cos(5z)$; $f_y = 4 e^{(3x+4y)} \cos(5z)$

$f_{xx} = 9 e^{(3x+4y)} \cos(5z)$; $f_{yy} = 16 e^{(3x+4y)} \cos(5z)$

$f_z = -5 e^{(3x+4y)} \sin(5z)$

$f_{zz} = -25 e^{(3x+4y)} \cos(5z)$

$9 e^{(3x+4y)} \cos(5z) + 16 e^{(3x+4y)} \cos(5z) + (-25 e^{(3x+4y)} \cos(5z)) = 0$

(29)

$f(x, y) = x^2 + y^2$

$x(t) = \cos t + \sin t$

$y(t) = \cos t - \sin t$

$w(t) = f(x(t), y(t))$

Right answer:

$\frac{dw}{dt} = f_x \cdot \frac{dx}{dt} + f_y \cdot \frac{dy}{dt}$

$= 2x(-\sin t + \cos t) + 2y(-\sin t - \cos t)$

$t=0 \left\{ \begin{array}{l} x=1 \\ y=1 \end{array} \right. \frac{dw}{dt}(t=0) = 2 \cdot 1(0) + 2 \cdot 1(0) = \boxed{0}$

$w(t) = (\cos t + \sin t)^2 + (\cos t - \sin t)^2 = 2\cos^2 t + 2\sin^2 t$

$w(t) = 2$

$w'(t) = \boxed{0}$

TP2

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$$w = (x+y+z)^2$$

$$x = r-s$$

$$y = \cos(r+s)$$

$$z = \sin(r+s)$$

$$\frac{dw}{dr} (r=1, s=-1) = ?$$

$$w_r = w_x \cdot x_r + w_y \cdot y_r + w_z \cdot z_r$$

$$= 2(x+y+z) \cdot 1 + 2(x+y+z) \cdot (-\sin(r+s)) + 2(x+y+z) \cdot \cos(r+s)$$

$$r=1$$

$$x = 1 - (-1) = 2$$

$$s=-1$$

$$y = \cos(0) = 1$$

$$z = \sin(0) = 0$$

$$w_r (r=1, s=-1) = 2 \cdot 3 \cdot 1 + 2 \cdot 3 \cdot (-\sin(0)) + 2 \cdot 3 \cdot \cos(0)$$

$$= 6 + 0 + 6 = 12$$

36 (a) $f(x, y) = y - x$

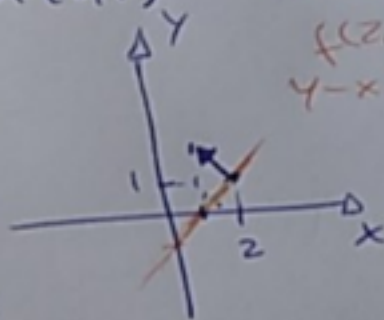
en $(2, 1)$

C.N.

$f(2, 1) = -1$
 $y - x = -1$

$$\nabla f = (f_x, f_y) = (-1, 1)$$

$$\nabla f(2, 1) = (-1, 1)$$



(b) $g(x, y) = xy^2$ en $(2, -1)$

$$\nabla g = (g_x, g_y) = (y^2, 2xy)$$

$$\nabla g(2, -1) = (1, -4)$$

C.N.

$g(2, -1) = 2$
 $xy^2 = 2$

