

## Quiz 23.

Q1.  $F = \nabla f$

$$\begin{aligned}
 &= \cancel{3xy^2z^3} + \cancel{3yx^2z^3} + \cancel{3z^3xy} \\
 \nabla \cdot F &= \begin{vmatrix} \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ P & Q & R \end{vmatrix} = ((9x^3y^2z^2 + x) - (9x^3y^2z^2 + x))i \\
 &\quad + [(9x^2y^3z^2 + y) - (9x^2y^3z^2 + y)]j \\
 &\quad + [(9x^2y^2z^3 + z) - (9x^2y^2z^3 + z)]k \\
 &= (0, 0, 0)
 \end{aligned}$$

$$= 0.$$

$\therefore$  it is conservative.

$$f_x = 3x^2y^3z^3 + yz$$

$$f = \int 3x^2y^3z^3 + yz = x^3y^3z^3 + xyz + g(y, z)$$

$$f_y = 3x^3y^2z^3 + xz = 3x^3y^2z^3 + xz + g_y(y, z)$$

$$\therefore g_y(y, z) = 0.$$

$$g(y, z) = h(z)$$

$$f_z = 3x^3y^3z^2 + xy = 3x^3y^3z^2 + xy + h'(z)$$

$$h'(z) = 0 \quad h(z) = C$$

$\therefore C$  can ignore.

$$\therefore f = x^3y^3z^3 + xyz.$$



No. ....

Date . . .

$$Q7. \quad \frac{dP}{dy} = 5 \quad \frac{dQ}{dx} = 10$$

$$\int_0^1 \int_0^1 (10 - 5) dx dy$$

$$= \int_0^1 5x \Big|_0^1 dy$$

$$= 5$$



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