

Q1) Find the curl and the divergence of the vector field $F = 4xy\mathbf{i} + (2x^2 + 2yz)\mathbf{j} + (3z^2 + y^2)\mathbf{k}$.

Q2) Find the directional derivative of $F = \frac{x^2 - y^2}{4} + z$ in the direction of $u = \mathbf{i} - 2\mathbf{j} + \mathbf{k}$ at the point $(-2, 2, 1)$.

Q3) Let P and Q have continuous first partial derivatives in an open simply connected region of the plane containing a smooth curve C . When the integral $\int_C [P dx + Q dy]$ is independent of the path C ?

Q4) Use Green's theorem to evaluate the line integral $\oint_C [2y dx + 5x dy]$, where C is the circle $(x - 1)^2 + (y + 3)^2 = 25$.

Q5) Evaluate $\oint_C xy^2 dy$ on the closed curve C defined by Fig1.

Solution