Muchammad Danial Kartiar
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Latsol Tutor KVJ 7

1. $\vec{F} = (z^2-1)i + (z+xy^2)j + 6k$

S → $x = 6 - 4y^2 - 4z^2$

$x = -2$

→ $x = 6 - 4y^2 - 4z^2$

$-2 = 6 - 4y^2 - 4z^2$

$y^2 + z^2 = 2$

$r(t) = (-2, \sqrt{2}\sin t, \sqrt{2}\cos t), \quad 0 \le t \le 2\pi$

~~$F(r(t)) = r'(t)$~~

$r'(t) = (0, \sqrt{2}\cos t, -\sqrt{2}\sin t)$

$F(r(t)) \cdot r'(t) = (2\cos^2 t - 1, \sqrt{2}\cos t - 4\sqrt{2}\sin^2 t, 6) \cdot (0, \sqrt{2}\cos t, -\sqrt{2}\sin t)$

$= 2\cos^2 t - 8\cos t \sin^2 t - 6\sqrt{2}\sin t$

$= (1 + \cos(2t)) - 8\cos t \sin^2 t - 6\sqrt{2}\sin t$

$\iint_S \text{curl } F \cdot dS = \int_C F \cdot dr$

$= \int_0^{2\pi} [1 + \cos(2t)] - 8\cos t \sin^2 t - 6\sqrt{2}\sin t \, dt$

$= \left(t + \frac{1}{2}\sin(2t) - 2\sin^4 t + 6\sqrt{2}\cos t\right) \Big|_0^{2\pi} = 2\pi$