

q25 Rahul Paleja

Section: 22

① Compute  $\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} + \frac{\partial R}{\partial z}$

According to the question  $\langle P, Q, R \rangle = \text{curl}(F)$   
and  $\frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} + \frac{\partial R}{\partial z}$  represent the div of that  
curl. Thus, we are evaluating  $\text{div}(\text{curl}(F))$   
which always equals 0.

② Use divergence Theorem

$$\begin{aligned}\text{div}(F) &= \frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} + \frac{\partial R}{\partial z} \\ &= 2 + 2 + 2 = 6\end{aligned}$$

$$\int_0^1 \int_0^4 \int_0^5 6 \, dz \, dy \, dx$$

$$\hookrightarrow 6 \int_0^1 \int_0^4 \int_0^5 dz \, dy \, dx$$

inner: 5 Middle: 4 Outer: 1

$$6 \cdot 5 \cdot 4 \cdot 1 = \boxed{120}$$