$\iint_S \vec{f}\,\vec{ds}$ = By using Gauss divergence theorem we convert surface $\iint$ to volume $\iiint_V$

$$\iint_S \vec{f}\,\vec{ds} = \iiint_V \operatorname{div}\vec{f}\,d\vec{v}$$

$$\operatorname{div}\vec{f} = \vec{\nabla}\cdot\vec{f}$$

$$\operatorname{div}\vec{f} = \left(\hat{i}\frac{\partial}{\partial x} + \hat{j}\frac{\partial}{\partial y} + \hat{k}\frac{\partial}{\partial z}\right)\left((x+z)\hat{i} + (y+z)\hat{j} + (z+x)\hat{k}\right)$$

$$\operatorname{div}\vec{f} = \frac{\partial}{\partial x}(x+z) + \frac{\partial}{\partial y}(y+z) + \frac{\partial}{\partial z}(z+x)$$

$$\nabla\vec{f} = 1+1+1 = 3$$

$$\iiint 3\,dv$$

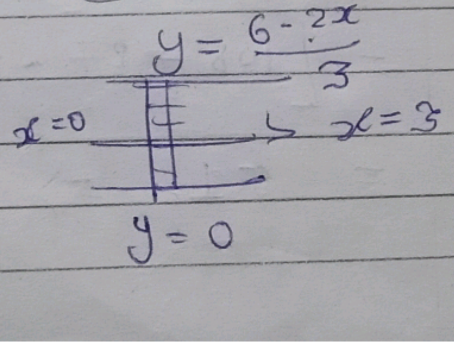
Know given Eqn

$$2x+3y+z=6$$

$$\frac{x}{3} + \frac{y}{2} + \frac{z}{6} = 1$$

$$z = 6-2x-3y$$

$$x=0,\ y=0,\ z=0$$



$$\int_{x=0}^{3}\int_{y=0}^{y=\frac{6-2x}{3}}\int_{z=0}^{z=6-2x-3y} 3\,dz\,dy\,dx$$

$$\int_{x=0}^{3}\int_{y=0}^{y=\frac{6-2x}{3}} 3\left[z\right]_0^{6-2x-3y} dy\,dx$$

$$\int_{x=0}^{3}\int_{y=0}^{\frac{6-2x}{3}} 3\left[6-2x-3y\right] dy\,dx$$

$$\int_{x=0}^{3} 3\left[6y-2xy-\frac{3y^2}{2}\right]_{y=0}^{\frac{6-2x}{3}} dx$$

$$\int_{x=0}^{3} 3\left[(6-2x)y-\frac{3y^2}{2}\right]_{y=0}^{\frac{6-2x}{3}} dx$$

$$\int_{x=0}^{3}\left[\frac{(6-2x)(6-2x)}{3}-\frac{3}{2}\left(\frac{6-2x}{3}\right)^2\right]dx$$

$$\int_{x=0}^{3} 3\left[\frac{(6-2x)^2}{3}-\frac{3}{2}\,\frac{(6-2x)^2}{9}\right]dx$$

$$\int_{x=0}^{3} 3\left[\frac{(6-2x)^2}{3}-\frac{(6-2x)^2}{6}\right]dx$$

$$\int_{x=0}^{3} 3\left[\frac{2(6-2x)^2-(6-2x)}{6}\right]dx$$

$$\int_{x=0}^{3} 3\left[\frac{(6-2x)^2}{6}\right]dx$$

$$\int_{x=0}^{3} 3\left[\frac{36+4x^2-24x}{6}\right]dx$$

$$\int_{x=0}^{3}\frac{\cancel{3}}{\cancel{6}_2}\left[36+4x^2-24x\right]dx$$

$$\int_{x=0}^{3}\left[18+2x^2-12x\right]dx$$

$$\left[18x+\frac{2x^3}{3}-\frac{12x^2}{2}\right]_{x=0}^{3}$$

$$\left[18(3)+\frac{2(3)^{\cancel{3}}}{\cancel{3}}-\frac{\cancel{12}^{6}(3)^2}{\cancel{2}}\right]$$

$$\cancel{54}+18-\cancel{54}$$

18 Ans