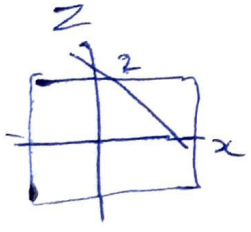
$$\vec{F} = x^2\hat{i} + 2z\hat{j} - 3y\hat{k}$$

$S:\ y^2 + z^2 = 4$

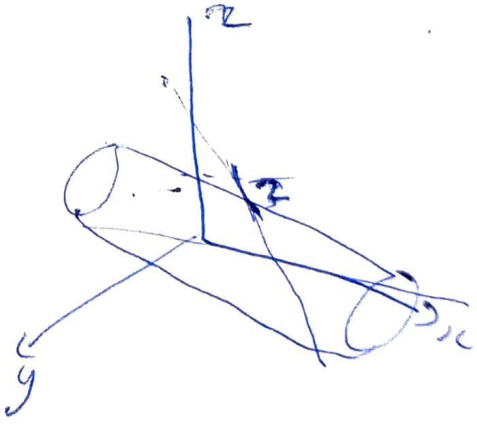
$$\hat{n} = \frac{2y\hat{i} + 2z\hat{k}}{2\sqrt{y^2+z^2}} = \frac{y\hat{i} + z\hat{k}}{\sqrt{y^2+z^2}}$$

$$\iint F \cdot n\, dS = \int\int \frac{2yz - 3yz}{\sqrt{y^2+z^2}} \frac{dx\,dz}{\frac{y}{\sqrt{y^2+z^2}}}$$



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

put $y = 0$ in $y^2 + z^2 = 4$



$$\Rightarrow -\int_{z=0}^{2} (3-z)z\, dz$$

$$\Rightarrow -\left[\frac{3z^2}{2} - \frac{z^3}{3}\right]_0^2$$

$$\Rightarrow -\left[6 - \frac{8}{3}\right] = -\left[\frac{18-8}{3}\right] = \boxed{-\frac{10}{3}}$$