

$$Z = 2 - 3y + x^2$$

$$0 = 2 - 3y + x^2 - z$$

$$\hat{n} = \frac{2x\hat{i} - 3\hat{j} - \hat{k}}{\sqrt{10 + 4x^2}}$$

$$\iint F \cdot d\vec{S} = - \iint \frac{(6x^2 - 6z - 12y^2)}{\sqrt{10 + 4x^2}} \frac{1}{\sqrt{10 + 4x^2}} dx dy$$

$$\Rightarrow - \iint (6x^2 + y^2 - 1 - 6(2 - 3y + x^2))$$

$$\Rightarrow - \iint (y^2 + 18y - 13) dx dy$$

$$= - \int_{y=-4}^0 \int_{x=-\frac{y}{2}}^{x=2} (y^2 + 18y - 13) dx dy$$

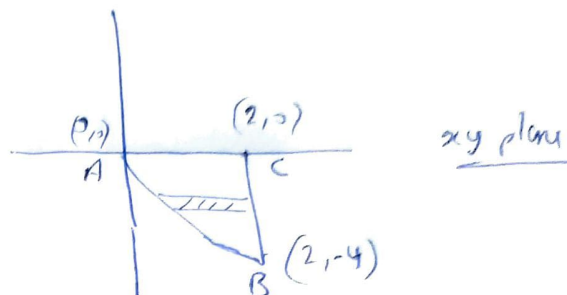
$$= - \int_{-4}^0 2y^2 + 18 \times 2y - 26 + \frac{y^3}{2} + 9y^2 - \frac{13}{2} y$$

$$\Rightarrow - \int_{-4}^0 11y^2 + \frac{y^3}{2} + \frac{59}{2} y - 26$$

$$\Rightarrow - \left[\frac{11y^3}{3} + \frac{y^4}{4} + \frac{59y^2}{4} - 26y \right]_{-4}^0$$

$$\Rightarrow - \left[-\frac{704}{3} + 32 + 236 + 104 \right]$$

$$\Rightarrow \frac{704}{3} - 372 = \frac{704 - 1116}{3} = -137.3333$$



$$AB: \frac{-4-0}{2-0} = \frac{y-0}{x-0}$$

$$x = -\frac{y}{2}$$

$$BC: x = 2$$

(oriented in -ve z direction)