Q5)

Sama as Q4 just put

$$x = 4\cos\theta$$
$$y = 2\sin\theta$$

Ans = 16π

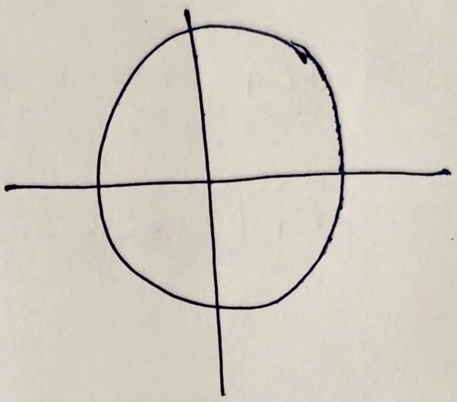
Q4) Find the work done in moving particale once round the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, $z = 0$ under the field of force

$F = (2x - y + z)\,i + (x + y - z^2)\,j + (3z - 2y + 4k)\,k$.

Solⁿ.

Here $z = 0$

$dz = 0$



$w = \int \bar{F} \cdot d\bar{r}$

$= \int (2x - y) \cdot dx + (x + y) \cdot dy$ ——— $(z = 0, dz = 0)$. —— ①

Put

$x = 5\cos\theta \qquad y = 4\sin\theta$

$dx = 5(-\sin\theta) \cdot d\theta \qquad dy = 4\cos\theta \cdot d\theta$ —— ⑪

From ① – ⑪

~~$w = \int_0^{2\pi} 2 \times 5(-\sin\theta) - 48$~~

$w = \int_0^{2\pi} [2(5\cos\theta) - 4\sin\theta] \cdot 5(-\sin\theta) \cdot d\theta + (5\cos\theta + 4\sin\theta) \cdot 4\cos\theta \cdot d\theta$

$w = \int_0^{2\pi} [-25(2\sin\theta \cdot \cos\theta) + 20\sin^2\theta] \cdot d\theta + (20\cos^2\theta + 16\sin\theta \cdot \cos\theta) \cdot d\theta$

$w \int_0^{2\pi} [-50\sin\theta \cdot \cos\theta + 20(\sin^2\theta + \cos^2\theta) + 16\sin\theta \cdot \cos\theta] \cdot d\theta$

$$W = \int_0^{2\pi} (-34\sin\theta \cdot \cos\theta + 20) \cdot d\theta \quad - (\sin^2\theta + \cos^2\theta = 1)$$

$$W = \int_0^{2\pi} \left[-17(2\sin\theta \cdot \cos\theta) + 20\right] \cdot d\theta$$

$$= -17 \int_0^{2\pi} (\sin 2\theta + 20) \cdot d\theta$$

$$= -17 \int_0^{2\pi}$$

$$= \left[-\cos 2\theta + 20\theta\right]_0^{2\pi}$$

$$= -17 [$$

$$W = \int_0^{2\pi} \left[-17(\sin 2\theta) + 20\right] \cdot d\theta \quad \text{---} \quad \sin 2\theta = 2\sin\theta \cdot \cos\theta$$

$$W = \int \left[-17\cos 2\theta\right]_0^{2\pi} + \left[20\theta\right]_0^{2\pi}$$

$$W = 17\left[\cos 4\pi - \cos 0\right] + 20(2\pi - 0)$$

$$W = 17(-1+1) + 40\pi$$

$$\boxed{W = 40\pi}$$