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Math

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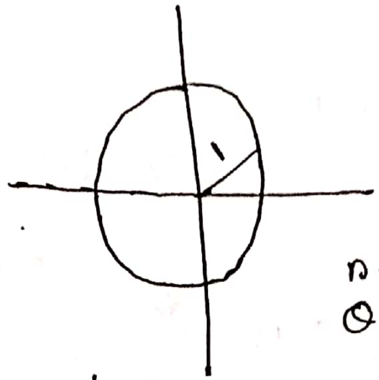
1. $$\int_{-1}^{1}\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}}\int_{0}^{1-x^2-y^2} 2x^2 \, dz\, dy\, dx$$



$r = 0 \to 1$
$\theta = 0 \to 2\pi$

$$\int_0^{2\pi}\int_0^1\int_0^{1-r^2} 2(r\cos\theta)^2 \, dz \, r\,dr\,d\theta$$

$$= \int_0^{2\pi}\int_0^1\int_0^{1-r^2} 2r^2\cos^2\theta \, dz\, r\,dr\,d\theta$$

$$= \int_0^{2\pi}\int_0^1 2r^3\cos^2\theta \int_0^{1-r^2} dz\,dr\,d\theta$$

$$= \int_0^{2\pi}\int_0^1 2r^3\cos^2\theta\,[z]_0^{1-r^2}\,dr\,d\theta$$

$$= \int_0^{2\pi}\int_0^1 2r^3\cos^2\theta\,(1-r^2)\,dr\,d\theta$$

$$= \int_0^{2\pi}\int_0^1 2r^3\cos^2\theta - 2r^3\cos^2\theta \, dr\,d\theta$$

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$$\int_0^{2\pi} \left[\int_0^1 2r^2\cos^2\theta\, dr - \int_0^1 2r^3\cos^2\theta\, dr\right] d\theta$$

$$= \int_0^{2\pi} \left[2\cos^2\theta \left\{\left[\frac{r^4}{4}\right]_0^1 - \left[\frac{r^5}{5}\right]_0^1\right\} d\theta$$

$$= \int_0^{2\pi} 2\cos^2\theta \, \frac{1}{20} \, d\theta$$

$$= \frac{1}{10}\int_0^{2\pi} \cos^2\theta \, d\theta$$

$$= \frac{1}{10}\left[\frac{\sin^3\theta}{3}\right]_0^{2\pi}$$

$$= \frac{1}{10}\left[\frac{\sin^3 2\pi}{3} - \frac{\sin^3 0}{3}\right]$$

$= 0$ (Ans)

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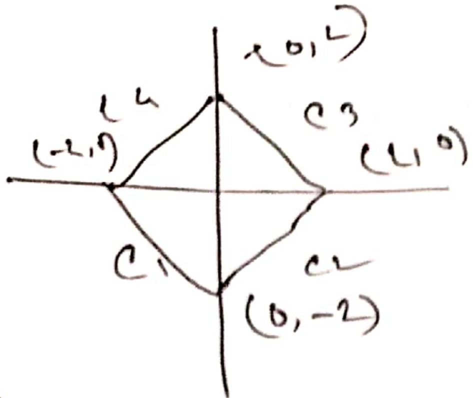
1



$(a,b) = (0+2 \; -2, 0)$

$= (2, -2)$

$\therefore$

$x = -2 + 2t$

$y = -2t$

$0 \leq t < 1$

$$c_1 = \int_0^1 ((-2+2t) - 2dt) - (-2t)\,2dt$$

$$= \int_0^1 (4-4t) + 4 + dt$$

$$= \int_0^1 4dt = [4t]_1^0 = 4$$

for.

$c_2 = (a,b) = (2+0, \; 0+2)$

$= (2, 2)$

$x = 2t$

$y = -2+2t \quad 0 \leq t \leq 1$

$$C_2 = \int_0^1 2 + (2)dt - (2+2t)\,2dt$$

$$= \int_0^1 -4 + 8dt$$

$$= -\int_0^1 4dt + \int_0^1 8dt$$

$$= \int 2+8$$

$$= 6$$