Subject: Problem Set 1.

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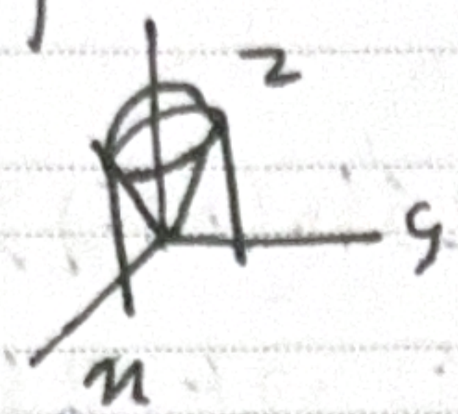
5A-2 dl

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



5A-3

$$\int_0^{1}\int_0^{1-x}\int_0^{1-x-y} z\,dz\,dy\,dx = \frac{1}{24}$$

$$m = \frac{1}{3}\cdot\frac{1}{2}\cdot\frac{1}{1} = \frac{1}{6}$$

$$\frac{1}{24}/\frac{1}{6} = \frac{1}{4}$$

5A-4 (a)

$$\int_0^{2\pi}\int_0^{r}\int_0^{h} r^2\,dz\,dr\,d\theta = \frac{2\pi h^4}{12}$$

(b)

$$\int_0^{2\pi}\int_0^{r}\int_0^{h} z\,r\cdot r\,dz\,dr\,d\theta = \frac{2\pi h^5}{15}$$

$$\frac{2}{15}\pi h^5 = \frac{4}{5}h$$

$$\Rightarrow \frac{2}{12}\pi h^4$$

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5A_5

$$4\int_0^1\int_0^{1-x}\int_0^{2(1-x-y)}(y^2+z^2)\,dz\,dy\,dx$$

5B-1 b)

$$\int_0^{\frac{\pi}{2}}\int_0^{\frac{\pi}{2}}\int_0^{\infty}\rho\,d\rho\,d\phi\,d\theta$$

c)

$$\int_0^{2\pi}\int_0^{\frac{\pi}{4}}\int_0^{2\cos\theta}\rho\,d\rho\,d\phi\,d\theta$$

5B-2

$$\int_0^{2\pi}\int_0^{\frac{\pi}{2}}\int_0^{a}\frac{\rho^2\sin\phi}{\langle x,y,z\rangle}\,d\rho\,d\phi\,d\theta$$

$$\int_0^{2\pi}\int_0^{\frac{\pi}{2}}\int_0^{a}\rho^2\sin\phi$$

5B-3

$$\iiint r^2z+\rho^2\sin\phi$$

$$=\frac{\pi a^6}{2^{6.3}}$$

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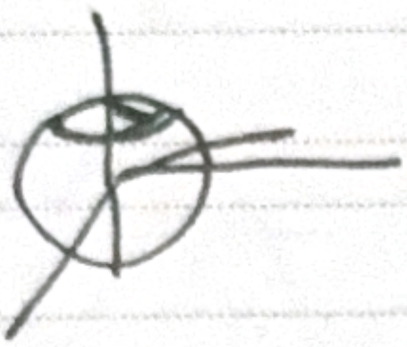
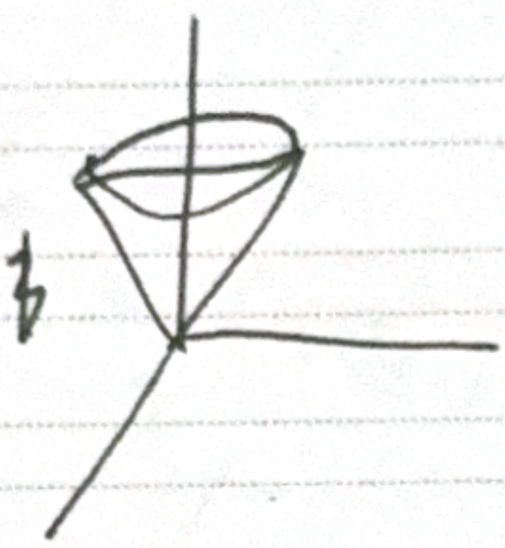
5B-4 b) $\int_0^{2\pi}\int_0^{\pi}\int_0^{a} r\rho^2 \sin\phi \, d\rho \, d\phi \, d\theta$



$= \frac{\pi^2 a^4}{4}$

5C-2

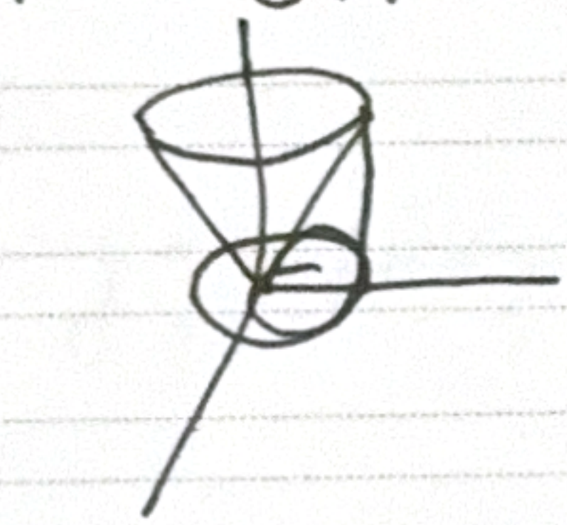


$\int_0^{2\pi}\int_0^{\alpha}\int_0^{2r\cos\theta} G \cdot z \cdot d\rho \, d\phi \, d\theta$

$= 4\pi G\left(1-\frac{2}{\sqrt{5}}\right)$

Part 土土

Problem 1



a) $\int_0^{\pi}\int_0^{2\sin\theta}\int_0^{r} dz \, r \, dr \, d\theta$

$= \frac{3^2}{2}\int_0^{\pi}\int_0^{2\sin\theta} r^2 \, dr \, d\theta$

b) $\frac{1}{V}\int_0^{c}\int_0^{c}\int_0^{z} dz \, r \, dr \, d\theta$

$= \frac{3\pi}{4c} \Rightarrow \frac{27\rho}{128}$

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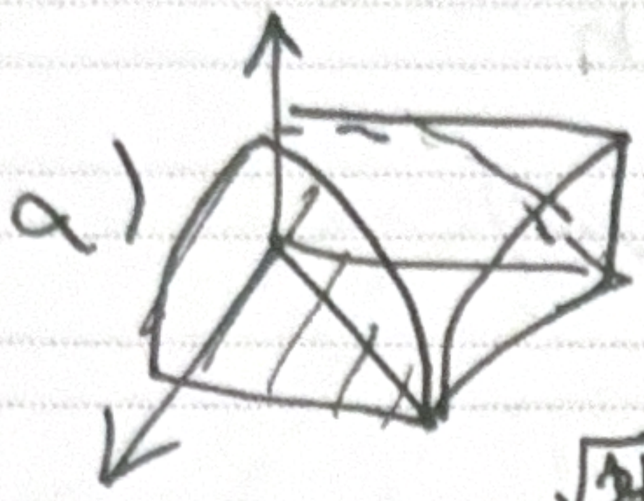
Problem 2

a)



b) $\int_0^2 \int_0^{\sqrt{4-z^2}} \int_0^{2x} dy\,dx\,dz$

c) $\int_0^4 \int_0^{\sqrt{4-(y/2)^2}} \int_0^{\sqrt{4-z^2}} dx\,dz\,dy$

d) $16/3$

$16/3$

$16/3$

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Problem 3

$$\int_0^{1009} \int_{10^3}^{81} 9z \, dz \, dy \, dy$$

$$81z^4$$