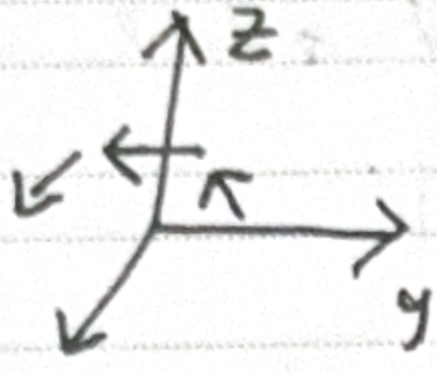
Subject: Problem Set 11

Year. Month. Date. ( )

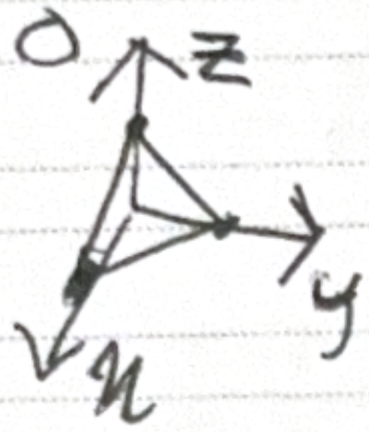
6A-3 $w\langle -\vec{z}, y\rangle$



6B-1 $4\pi a^3$

6B-2

6B-3



$\frac{\langle 1,1,1\rangle}{\sqrt{3}} \cdot \langle 1,0,0\rangle = \frac{1}{\sqrt{3}} i$

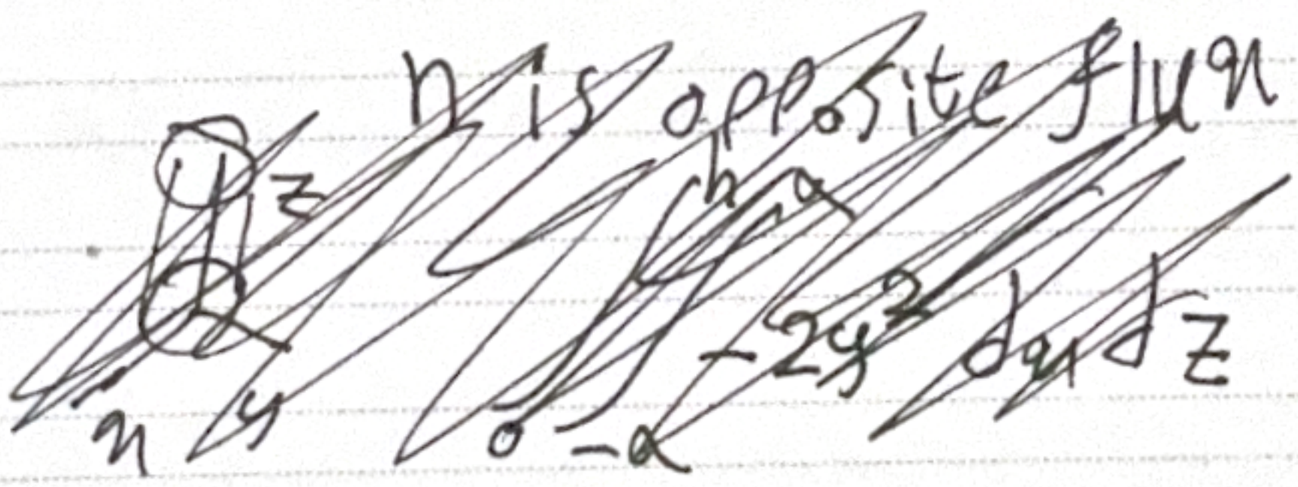
$\frac{1}{2}\sqrt{2} \cdot \frac{\sqrt{3}}{2}\sqrt{2} \cdot \frac{1}{\sqrt{3}} = \frac{1}{2}$

6B-6

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

his opposite flux

6B-8



his opposite flux

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\int_c^h a^2 \sin\theta\, dz\, d\theta = \frac{\pi}{2} a^2 h$$

Subject:

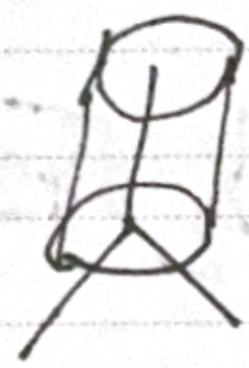
Year. Month. Date. ( )

6C_3 $\iiint_D \operatorname{div} F \, dV = 3\frac{2}{3}\pi a^3$

$\iint_{S_1} \frac{x^2+y^2+z^2}{a} dS + \iint_{S_2} -z \, dS.$

$= 2\pi a^3$

6C_5 $\frac{1}{3}\frac{1}{2} \quad 1 = \frac{1}{6}$

6C_7 a)  $\iiint_D 3x \, dV = 0$

6C_8 a) closed surface $\rightarrow S_1 + S_2 = a$

$\rightarrow S_1 = -S_2$

b) a

Subject:

Year. Month. Date. ( )

Part II

Problem 1

$$\iint_S D\,ds = \int_0^{2\pi}\int_0^{\pi} a^2 \sqrt{2}(1-\cos\phi)^{\frac{1}{2}} \sin\phi\, d\phi\, d\theta = \frac{16\pi a^3}{3}$$

$$\Rightarrow D = \frac{4a}{3}$$

Problem 2

$$\sigma \int_0^{2\pi}\int_0^{\phi_0}\int_0^{a} \frac{\rho\cos\phi}{\rho^3}\,\frac{\ell^2\cos\phi}{\rho^3}\,\rho^2\sin\phi\, d\rho\, d\phi\, d\theta$$

$$= G\pi a \sin^2\phi_0$$

Problem 3

a) $\iint_T F\cdot h\, dS = \Pi$

b) $S = \frac{4\pi\sqrt{2}}{3} - \frac{2\pi}{3}$

c) $\int_0^{2\pi}\int_0^{1} r^2\, dr\, d\theta = \frac{2\pi}{3}$

Subject:

Year, Month, Date, ( )

Problem 4

a) $-\rho^{-3} + 3x^2\rho^{-5} + (-\rho^{-3} + 3y^2\rho^{-5}) + (-\rho^{-3} + 3z^2\rho^{-5}) = 0$

b) $F \cdot h = -\frac{1}{r^2} \Rightarrow \oint 4\pi x = -4\pi$

c) $\iint_{S_1} F \cdot h \, dS = -4\pi$

5. $\pm \oiint_S |\nabla f| \, dS = \iiint_G \nabla^2 f \, dV$