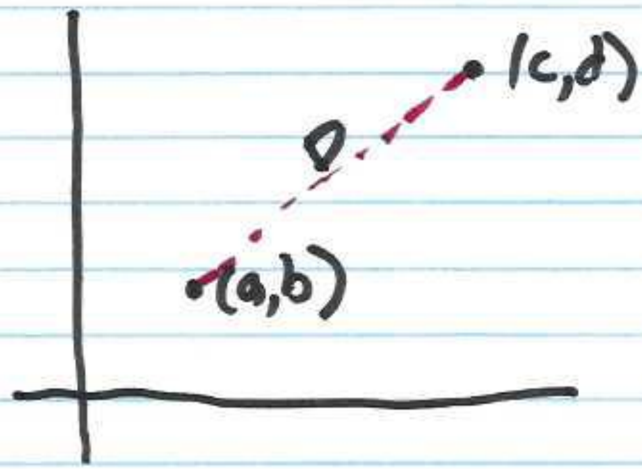
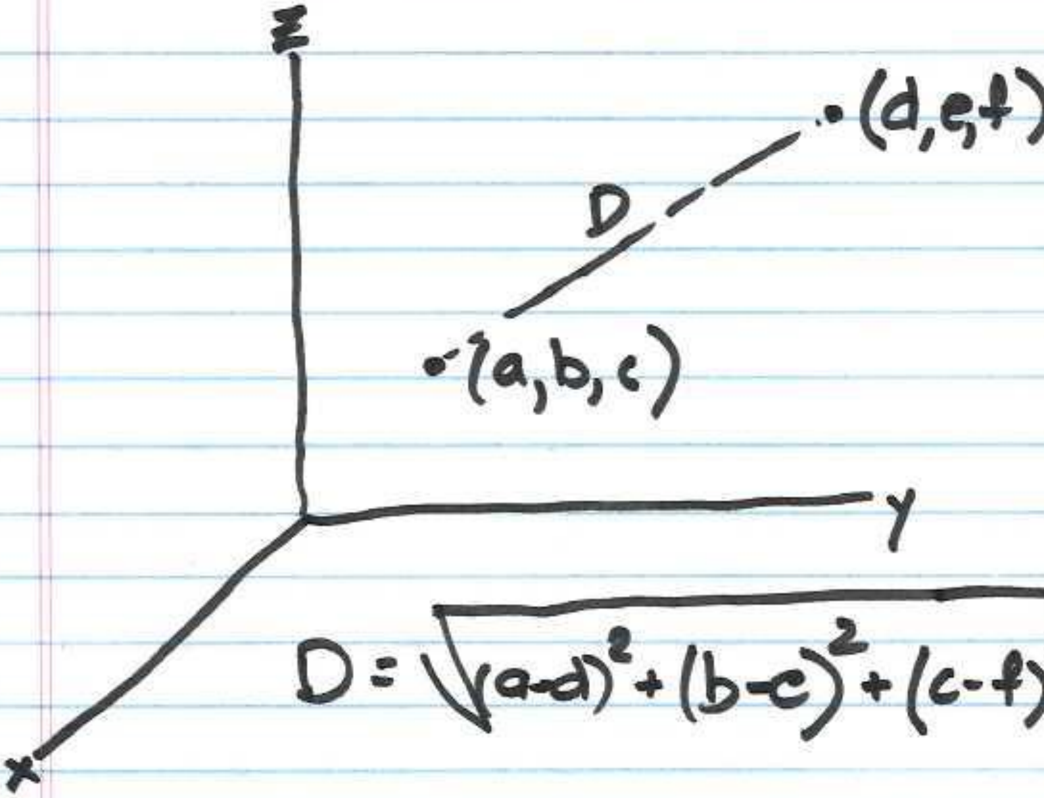
PNAYD

1



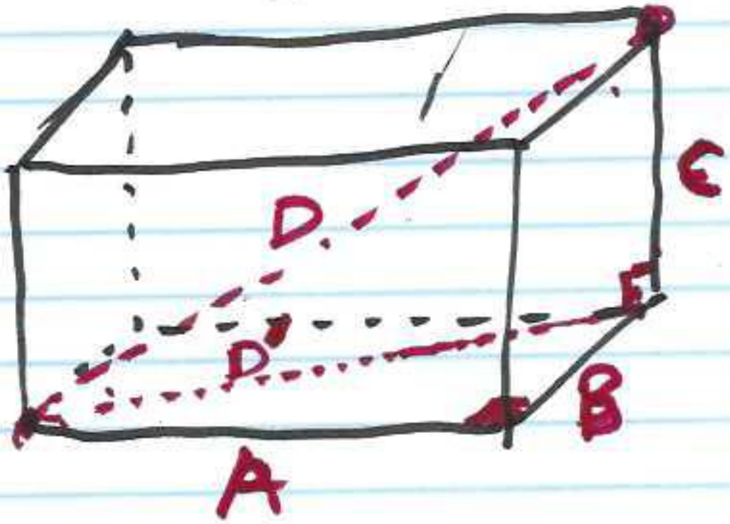
Use Pythagorean theorem

$$D = \sqrt{(a-c)^2 + (b-d)^2}$$



$$D = \sqrt{(a-d)^2 + (b-e)^2 + (c-f)^2}$$

(2)



Want to show $D^2 = A^2 + B^2 + C^2$

$$(D')^2 = A^2 + B^2 \quad \text{(Pyth)}$$

$$D^2 = \underbrace{(D')^2}_{} + C^2$$

$$D^2 = A^2 + B^2 + C^2$$

so... $D = \sqrt{A^2 + B^2 + C^2}$

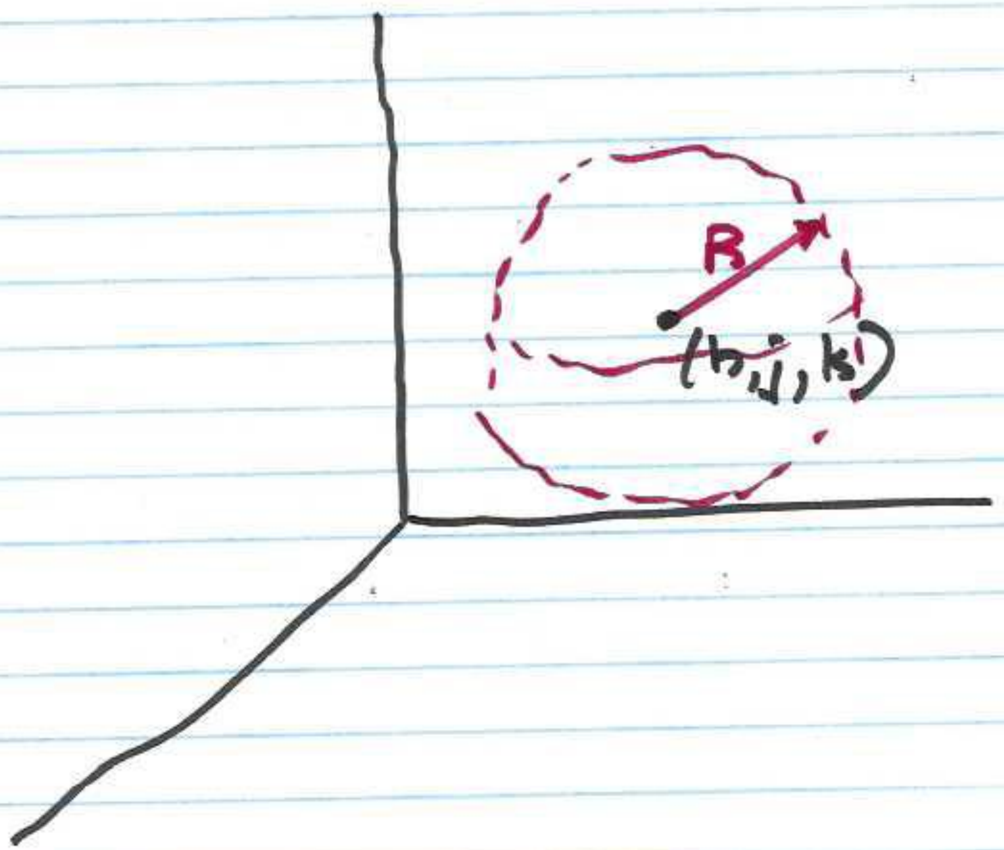
In $\mathbb{R}^3$ what is equation of a sphere

$$(a-0)^2 + (b-0)^2 + (c-0)^2 = 1^2$$

so $a^2 + b^2 + c^2 = 1$ eqn of unit sphere

Move center to (h,j,k) & change radius to R:

$$(x-h)^2+(y-j)^2+(z-k)^2=R^2$$



Problems:

51 Find center & radius of sphere

$$(x+2)^2+y^2+(z-2)^2=8$$

Center $(-2,0,2)$

Radius: $2\sqrt{2}$

④

55) $x^2+y^2+z^2+4x-4z=0$

$$\underbrace{x^2+4x+4}\quad \underbrace{z^2-4z+4} \qquad +4+4$$

$$(x+2)^2+y^2(z-2)^2=8$$

58) $3x^2+3y^2+3z^2+2y-2z=9$

$\div 3$ $\quad x^2+y^2+z^2+\frac{2}{3}y-\frac{2}{3}z=3$

$$(x-0)^2+\left(y+\frac{1}{3}\right)^2+\left(z-\frac{1}{3}\right)^2=3+\frac{1}{9}+\frac{1}{9}$$

$$x^2+\left(y+\frac{1}{3}\right)^2+\left(z-\frac{1}{3}\right)^2=\frac{29}{9}$$

Find a unit vector in the direction of the vector <u>from</u> $P_1=(1,0,1)$ <u>to</u> $P_2:(3,2,0)$

$V=\langle 2,2,-1\rangle$

Need $|V|=\sqrt{2^2+2^2+(-1)^2}=3$

$U=\left\langle \frac{2}{3},\frac{2}{3},\frac{-1}{3}\right\rangle$

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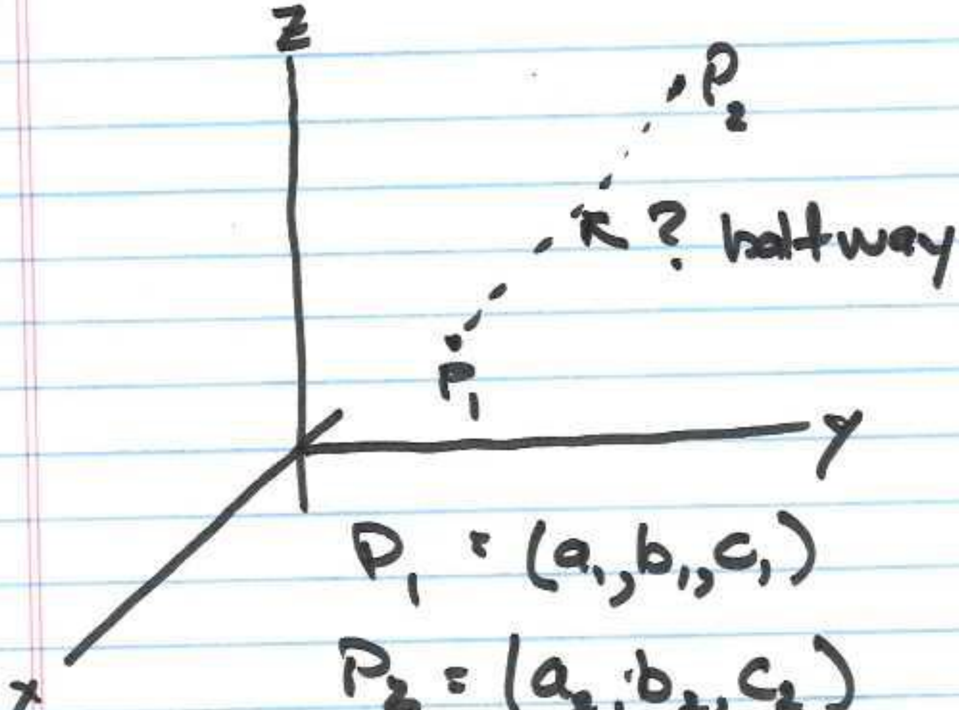
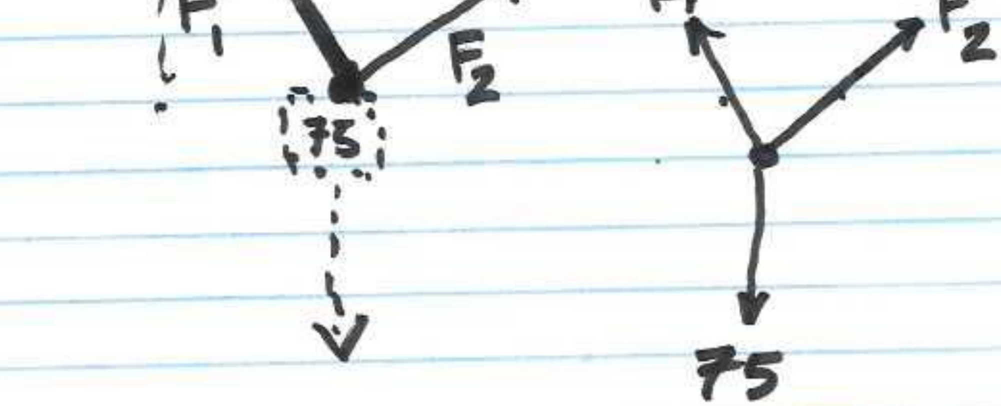


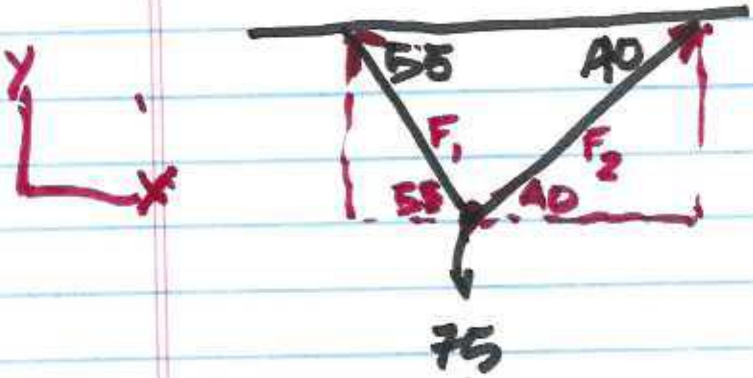
$P_1 = (a_1, b_1, c_1)$

$P_2 = (a_2, b_2, c_2)$

then... $M = \left(\frac{a_1+a_2}{2}, \frac{b_1+b_2}{2}, \frac{c_1+c_2}{2} \right)$



⑥



① $F_1 + F_2 = 75.$

$$F_1 = \langle -|F_1|\cos 55^\circ, |F_1|\sin 55^\circ \rangle$$

$$F_2 = \langle |F_2|\cos 40^\circ, |F_2|\sin 40^\circ \rangle.$$

Balance x direction : $-|F_1|\cos 55^\circ + |F_2|\cos 40^\circ = 0$

Balance y-direction : $|F_1|\sin 55^\circ + |F_2|\sin 40^\circ = 75$

$\Big\Downarrow$ algebra

$$|F_1| = \frac{75}{\sin 55^\circ + \cos 55^\circ \cdot \tan 40^\circ}$$

$$|F_2| = \frac{|F_1|\cos 55^\circ}{\cos 40^\circ}$$

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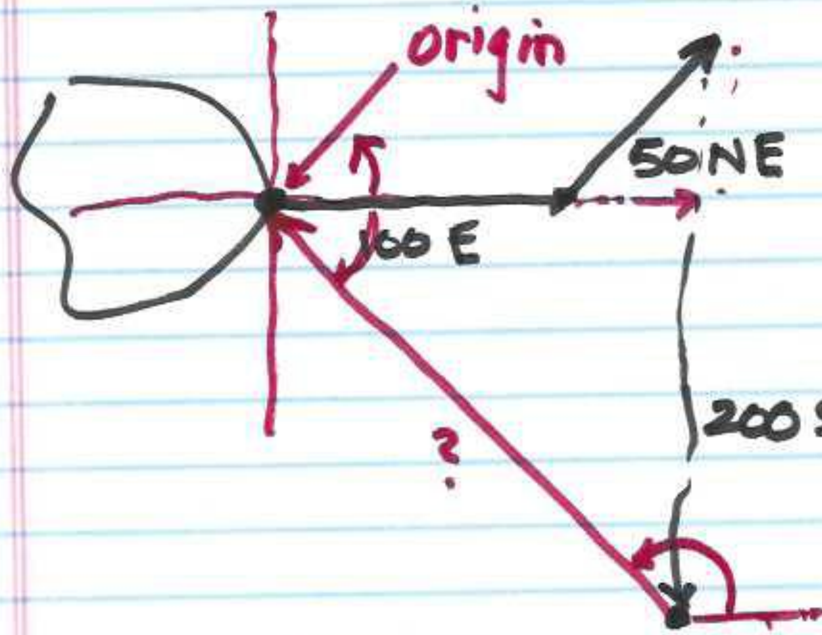

$D_1 = \langle 100, 0 \rangle \quad D_2 = 50\left\langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right\rangle$

$D_3 = \langle 0, -200 \rangle$

$D_1 + D_2 + D_3 = \langle 100 + 25\sqrt{2}, -200 + 25\sqrt{2} \rangle$

$R = \langle \underbrace{-100 - 25\sqrt{2}}_{x}, \underbrace{200 - 25\sqrt{2}}_{y} \rangle$

$\Theta = \arctan\left(\frac{200 - 25\sqrt{2}}{-100 - 25\sqrt{2}} \right)$

$|R| = \sqrt{(-100 - 25\sqrt{2})^2 + (200 - 25\sqrt{2})^2}$

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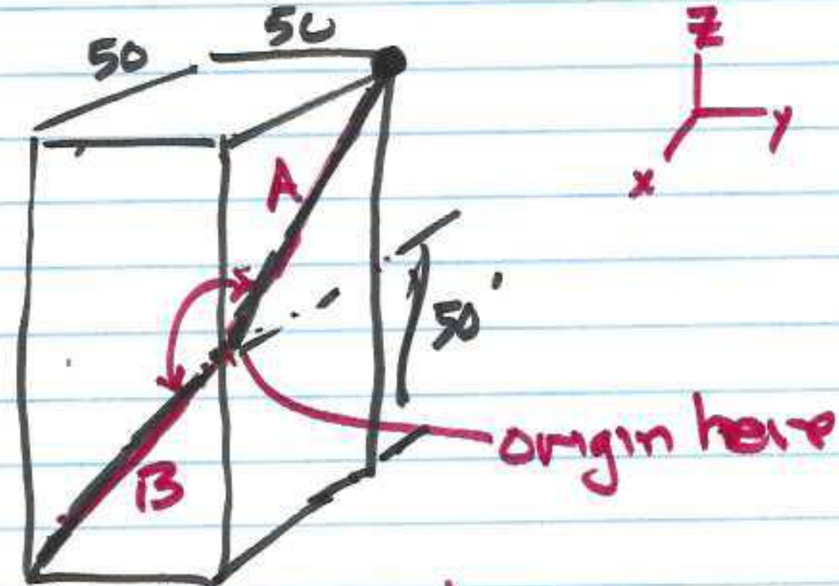
Def^{n} $A \cdot B = a_1 b_1 + a_2 b_2 + a_3 b_3$

where $A = \langle a_1, a_2, a_3 \rangle$, $B = \langle b_1, b_2, b_3 \rangle$

In use $A \cdot B = |A||B| \cos \theta_{AB}$



$$\theta_{AB} = \arccos \left(\frac{A \cdot B}{|A||B|} \right)$$

$A = \langle -50, 0, 50 \rangle$ $B = \langle 0, -50, -50 \rangle$

$A \cdot B = -2500$

$|A| = |B| = \sqrt{2500 + 2500} = 50\sqrt{2}$

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$$\theta = \arccos\left(\frac{-2500}{5000}\right) = \arccos(-.5)$$

$\sim \underline{\underline{120^\circ}}$