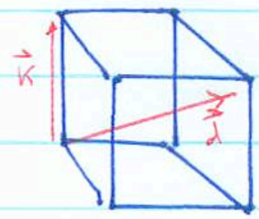
2-1 Diagonal $\hat{d} = \dfrac{(\hat{i} + \hat{j} + \hat{k})}{\sqrt{3}}$



$\cos\theta = \hat{k}\cdot\hat{d}$

$= \frac{1}{\sqrt{3}}$; $\theta = \cos^{-1}\left(\frac{1}{\sqrt{3}}\right) = 54.7°$

2-2 a) Prove $|\bar{A}\times\bar{B}|$ is the area of their parallelogram.

Area is base × height = $A\cdot(B\sin\theta)$

Area $= AB\sin\theta = |\bar{A}\times\bar{B}|$

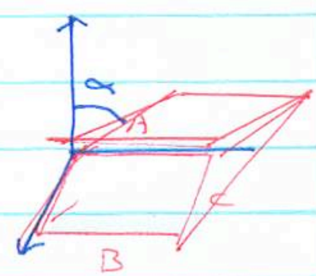
b) $\bar{A}\times\bar{B}$ is a vector, $AB\sin\theta$ is not.

c) Prove $\bar{A}\cdot(\bar{B}\times\bar{C})$ is the determinant:

$$\bar{A}\cdot(\bar{B}\times\bar{C}) = A_x(B_y C_z - B_z C_y) + A_y(B_z C_x - B_x C_z) + A_z(B_x C_z - B_z C_x)$$

= Determinant.

d) Show the parallelpiped defined by $\bar{A}, \bar{B}, \bar{C}$ has volume $\bar{A}\cdot(\bar{B}\times\bar{C})$.



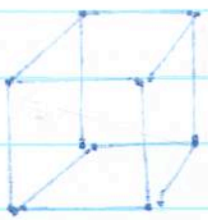
$\bar{A}\cdot(\bar{B}\times\bar{C}) = A\cos\alpha\,(\bar{B}\times\bar{C})$

$(\bar{B}\times\bar{C})$ has area of base,

height is $A\cos\alpha$

Volume is $\bar{A}\cdot(\bar{B}\times\bar{C})$

2-1 Diagonal $\hat{d} = \frac{(\hat{i} + \hat{j} + \hat{k})}{\sqrt{3}}$



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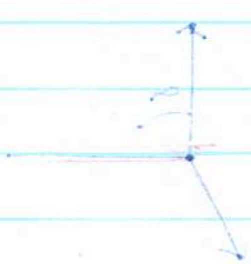

$\bar{A} \cdot (\bar{B} \times \bar{C}) = A\cos\alpha\,(\bar{B} \times \bar{C})$

$(\bar{B} \times \bar{C})$ has area of base, height is $A\cos\alpha$

Volume is $\bar{A} \cdot (\bar{B} \times \bar{C})$