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1_ $A=(-2,3)$ $B=(3,7)$ $C=(4,-4)$

a) $\vec{v} = \vec{AB} + 3\vec{AC} - 4\vec{CB}$

$\vec{v} = (5,4) + 3(6,-7) - 4.(-1,+11)$

$\vec{v} = (5,4) + (18,-21) - (-4,44)$

$\vec{v} = (27,-61)$

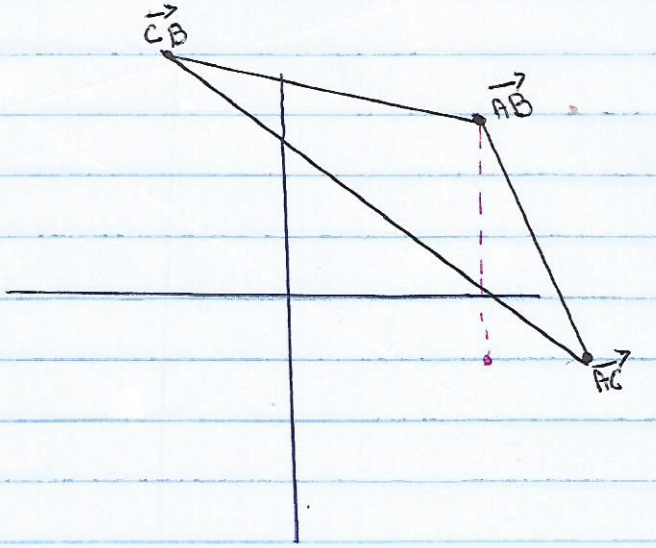
b) $\text{Área}(\Delta ABC) = \frac{1}{2}\left|\det\begin{pmatrix} 5 & 4 \\ 6 & -7 \end{pmatrix}\right| = \frac{1}{2}.|(-35-24)| = \frac{+59}{2}\ u$

c) $\text{Proj}_{\vec{AB}}\vec{AC}\ \frac{\langle(6,-7),(5,4)\rangle}{\|(5,4)\|^2}.(5,4)$

$\text{Proj}_{\vec{AB}}\vec{AC}\ \frac{30+(-28)}{\|25+16\|}(5,4)$

$\text{Proj}_{\vec{AB}}\vec{AC}\ \frac{2}{41}.(5,4)$

$\text{Proj}_{\vec{AB}}\vec{AC}\ \left(\frac{10}{41},\frac{8}{41}\right)$



2. $\cos\alpha = \frac{\langle u, v\rangle}{\|u\|.\|v\|}$ $\qquad \cos\frac{\pi}{3} = \frac{1}{2}$

$$\frac{1}{2} = \frac{\langle (2,1,-1)(1,-1,m+2)\rangle}{\sqrt{2^2+1^2+(-1)^2}.\sqrt{1^2+(-1)^2+(m+2)^2}}$$

$$\frac{1}{2} = \frac{2-1-m-2}{\sqrt{4+1+1}.\sqrt{1+1+m^2+4m+4}}$$

$$\frac{1}{2} = \frac{-1-m}{\sqrt{6}.\sqrt{m^2+4m+6}}$$

$$\left(\sqrt{6}.\sqrt{m^2+4m+6}\right)^2 = (-2(1+m))^2$$

$$6.(m^2+4m+6) = 4(m^2+2m+1)$$

$$3m^2+12m+18 = 2m^2+4m+2$$

$$m^2+8m+16 = 0$$

$\Delta = 8^2 - 4.1.(16)$

$\Delta = 64 - 64$

$\Delta = 0$

$m = \frac{-8 \pm \sqrt{0}}{2}$

$m = -4$

3- $\pi: \frac{x-2}{2} = \frac{y+1}{3} = \frac{z}{3}$ $\quad (1, +\frac{1}{2}, \frac{1}{3})$

$r: -x+1 = y = \frac{z-2}{2}$ $\quad \left(-1, 1, \frac{1}{2}\right)$

4_a) $\begin{vmatrix} 2 & 1 & -1 \\ 0 & -1 & 1 \\ 1 & 2 & 1 \end{vmatrix} \neq 0$

Não são colineares

$-2+1+0-1-4+0 \neq 0$

$-6 \neq 0$

b) $G=(x,y,z)$ $P=(2,1,-1)$ $Q=(0,-1,1)$ $R=(1,2,1)$

$\overrightarrow{GP} = (2-x, 1-y, -1-z)$

$\overrightarrow{PQ} = (-2, -2, 2)$

$\overrightarrow{QR} = (1, 3, 0)$

$\overrightarrow{RG} = (x-1, y-2, z-1)$

$G=(1,-2,-1)$

~~QR~~ $= d(P,Q) = \sqrt{(-2)^2+(-2)^2+2^2}$

$d(P,Q) = \sqrt{4+4+4}$

$d(P,Q) = 2\sqrt{3}$

$d(Q,R) = \sqrt{1^2+3^2+0^2}$

$d(Q,R) = \sqrt{1+9}$

$d(Q,R) = \sqrt{10}$

$d(G,P) = d(Q,R)$

$\sqrt{(2-x)^2+(1-y)^2+(-1-z)^2} = \sqrt{10}^2$

$(2-x)^2+(1-y)^2+(-1-z)^2 = 10$

$d(R,G) = d(P,Q)$

$\sqrt{(x-1)^2+(y-2)^2+(z-1)^2} = 2\sqrt{3}^2$

$(x-1)^2+(y-2)^2+(z-1)^2 = 4.3$

$(x-1)^2+(y-2)^2+(z-1)^2 = 12$