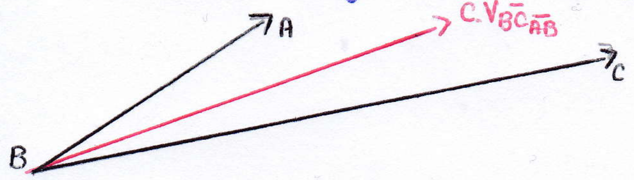
25. Sean los puntos $A(5,2,6)$; $B(1,2,3)$ y $C(9,4,9)$. Determinar la comp vectorial de $\bar{BC}$ en la direccion de $\bar{AB}$ y representarla graficamente en la figura:




$$C.V_{\bar{BC}_{\bar{AB}}} = \frac{\bar{BC}\cdot\bar{AB}}{|\bar{AB}|}\left(\frac{\bar{AB}}{|\bar{AB}|}\right)$$

$$C.V._{\bar{BC}_{\bar{AB}}} = \frac{(8,2,6)(-6,0,-3)}{\sqrt{(-6)^2+(0)^2+(-3)^2}}\left(\frac{(-6,0,-3)}{\sqrt{(-6)^2+(0)^2+(-3)^2}}\right)$$

$$= \frac{-66}{3\sqrt{5}}\cdot\frac{(-6,0,-3)}{3\sqrt{5}} = \frac{396}{45},\ \frac{0}{45},\ \frac{198}{45}$$

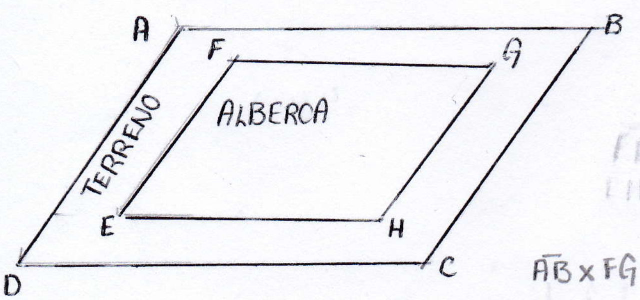
$$C.V._{\bar{BC}_{\bar{AB}}} = \left(\frac{41}{5}, 0, \frac{22}{5}\right)$$

$\bar{BC} = \bar{C}-\bar{B} = (9,4,9)-(1,2,3) = (8,2,6)$

$\bar{AB} = \bar{B}-\bar{A} = (1,2,3)-(5,2,6) = (-6,0,-3)$

12. En las instalaciones de un centro deportivo se decea construir una alberca cuya area sea $160\ m^2$, si el proyecto arquitectonico exige que los lados de la alberca sean paralelos a los lados del terreno, con los datos que se dan a continuacion y con ayuda de la fig., determinar vectorialmente las coordenadas de los puntos $G$ y $H$

$A(0,0,3)$, $B(0,22,3)$, $C(30,22,3)$ $D(30,0,3)$, $E(19,7,3)$, $F(3,7,3)$, $G(g_1,g_2,g_3)$ y $H(h_1,h_2,h_3)$




AREA $= 160\ m^2$

$\bar{AB} = (0,22,3)-(0,0,3) = (0,22,0)$

$\bar{BC} = (30,22,3)-(0,22,3) = (30,0,0)$

$\bar{FG} = (g_1,g_2,g_3)-(3,7,3) = (g_1-3,\ g_2-7,\ g_3-3)$

$$\bar{AB}\times\bar{FG} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 22 & 0 \\ g_1-3 & g_2-7 & g_3-3 \end{vmatrix} = (22)(g_3-3)-0,\ 0-0,\ 0-(22)(g_1-3)$$

$22g_3-66=0$; $22g=66$; $g_3=3$

$22g_1-66=0$; $22g=66$; $g_1=3$

$G=(3,g_2,3)$

$\bar{CD} = (30,0,3)-(30,22,3) = (0,-22,0)$

$\bar{EH} = (h_1,h_2,h_3)-(19,7,3) = (h_1-19,\ h_2-7,\ h_3-3)$

$$\bar{CD}\times\bar{EH} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & -22 & 0 \\ h_1-19 & h_2-7 & h_3-3 \end{vmatrix} = (-22)(h_3-3)-0,\ 0-0,\ 0-(-22)(h_1-19)$$

$G=(3,17,3)$

$H=(19,17,3)$

$22h_3-66=0$; $h_3=66/22=3$

$+22h_1+19=0$; $h_1=418/22=19$

$\bar{FE} = (19,7,3)-(3,7,3) = (16,0,0)$

$\bar{FG} = (g_1,g_2,g_3)-(3,7,3) = (g_1-3,\ g_2-7,\ g_3-3)$

$= (3-3,\ g_2-7,\ 3-3) = (0,g_2-7,0)$

$$\bar{FE}\times\bar{FG} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 16 & 0 & 0 \\ 0 & g_2-7 & 0 \end{vmatrix} = (0-0,\ 0-0,\ (16)(g_2-7)-0)$$

$16g-112=160$; $16g=272$

$g_2=272/16=17$

$G(3,17,3)$

$\bar{GH} = (19,h_2,3)-(3,17,3) = (16,h_2-17,0)$

$$\bar{BC}\times\bar{GH} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 30 & 0 & 0 \\ 16 & h_2-17 & 0 \end{vmatrix} = (0-0,\ 0-0,\ (30)(h_2-17))$$

$30h_2-510=0$; $h_2=510/30$

$h_2=17$

$H(19,17,3)$

$\bar{FG} = (0,10,0)$; $|\bar{FG}|=10$

$\bar{GH} = (0,16,0)$; $|\bar{GH}|=16$

$160\ m^2 = |\bar{FG}||\bar{GH}|$; $(10)(16)=160$