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Tarea Vectores

MULTIPLICACIÓN.

25)

Datos

$A = -5\hat{i} - 3\hat{j} + \hat{k}$

$B = 2\hat{i} + \hat{j} - 3\hat{k}$

a) A+B

$A+B = (-5\hat{i} - 3\hat{j} + \hat{k}) + (2\hat{i} + \hat{j} - 3\hat{k})$
$= (-5\hat{i} + 2\hat{i}) + (-3\hat{j} + \hat{j}) + (\hat{k} - 3\hat{k})$
$= -3\hat{i} - 2\hat{j} - 2\hat{k}$

b) A−B

$A-B = (-5\hat{i} - 3\hat{j} + \hat{k}) - (2\hat{i} + \hat{j} - 3\hat{k})$
$= (-5\hat{i} - 2\hat{i}) + (-3\hat{j} - \hat{j}) + (\hat{k} + 3\hat{k})$
$= -7\hat{i} - 4\hat{j} + 4\hat{k}$

c) 2A−3B

$2A-3B = 2(-5\hat{i} - 3\hat{j} + \hat{k}) - 3(2\hat{i} + \hat{j} - 3\hat{k})$
$= (-10\hat{i} - 6\hat{i}) + (-6\hat{j} - 3\hat{j}) + (2\hat{k} + 9\hat{k})$
$= -16\hat{i} - 9\hat{j} + 11\hat{k}$

29) ¿Cuál es el vecter unitario paralelo al vecter $A = 2\hat{i} + 4\hat{j} + 4\hat{k}$?

$|\vec{A}| = \sqrt{2^2 + 4^2 + 4^2} = \sqrt{4+16+16} = \sqrt{36} = 6$

$\vec{B} = \frac{2\hat{i}}{6} + \frac{4\hat{j}}{6} + \frac{4\hat{k}}{6} = \frac{1}{3}\hat{i} + \frac{2}{3}\hat{j} + \frac{2}{3}\hat{k}$

33)

Datos

NY

latitud 40° 48' N = 40.8°

longitud 73° 58' N = 73.460°

Capa Wrath

latitud 58° 36' N = 58.60°

longitud 5° 1' W = 5.01°

$R_T = 6371 Km$

$Z_1 = R_T \operatorname{Sen} \theta$
$= 6371 \operatorname{Sen} 40.8°$
$= 4162.94 km$

$R_{Txy_1} = R_T \operatorname{Cos} \theta$
$= 6371 km \operatorname{Cos} 40.80$
$= 4822.81 km$

$x_1 = R_T \operatorname{Cos} 73.960$
$= 1332.58 km$

$y_1 = R_{Txy} \operatorname{Sen} 73.960$
$= 4635.05 km$

$\vec{R_1} = (1332.58\hat{i} + 4635.05\hat{j} + 4162.94\hat{k})\,Km$

$Z_2 = R_T \operatorname{Sen} 58.6°$
$= 5437.97 km$

$R_{Txy} = 6371 \operatorname{Cos} 58.60$
$= 3210.35$

$x_2 = R_{Txy_2} \operatorname{Cos} 5.01°$
$= 3306.66 km$

$y_2 = R_{Txy_2} \operatorname{sen} 5.01°$
$= 289.87 km$

$\vec{R_2} = (3306.35\hat{i} + 289.87\hat{j} + 5437.97\hat{k})\,Km$

$\Delta_R = \vec{R_2} - \vec{R_1} = (1974.08\hat{\imath} - 4345.18\hat{\jmath} + 1275.03\hat{k})\ km$

$|\Delta_R| = \sqrt{(1974.08)^2 + (-4345.18)^2 + (1275.03)^2}$

$= 4945.05\ km$

37)

Datos

$V_1 = 5\hat{\imath} - 2\hat{\jmath} + k$

$V_2 = 2\hat{\imath} - k$

$\vec{V_1} \cdot \vec{V_2} = (5)(2) + (-2)(-1) + (1)(0)$

$= 10 + 2 + 0$

$= 12$

41) Encuentre el angulo entre el vector $A = 3\hat{\imath} + 4\hat{\jmath} + 2\hat{k}$ y el eje x

Datos

$A_x = 3$

$A_y = 4$

$A_z = 2$

$|\vec{A}| = \sqrt{3^2 + 4^2 + 2^2}$

$= \sqrt{9 + 16 + 4}$

$= \sqrt{29}$

$= 5.38$

$\cos\alpha = \frac{3}{5.38}$

$\alpha = \cos^{-1}\frac{3}{5.38}$

$= 56.10°$

45) Calcule el producto cruz de los vectores A y B del ejemplo 1

Datos

$\vec{A} = 2180m,\ E90°$

$\vec{B} = 1790m,\ S180°$

$A_x = 2180m$

$A_y = 0$

$A_z = 0$

$B_x = 0$

$B_y = -1790$

$B_z = 0$

$$A \times B = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 2180 & 0 & 0 \\ 0 & -1790 & 0 \\ \hat{\imath} & \hat{\jmath} & \hat{k} \\ 2180 & 0 & 0 \end{vmatrix} = -3902.200\hat{k}$$

49)

$\vec{C} = \vec{A} \times \vec{B} = (-2B_z - (3)(3))\hat{\imath} + (3Bx - (5)B_z)) + (5)(3) - (-2)B_x))$

$= (-2B_z - 9)\hat{\imath} + (3Bx - 5B_z)\hat{\jmath} + (15 + 2Bx)\hat{k}$

Datos

$\vec{A} = 5\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$

$\vec{B} = B_x\hat{\imath} + 3\hat{\jmath} + B_z\hat{k}$

$\vec{C} = A \times B = 2\hat{\jmath} + C_z\hat{k}$

$B_x\hat{\imath} = ?$

$B_z\hat{k} = ?$

$C_z\hat{k} = ?$

$0\hat{\imath} = (-2B_z - 9)$

$9 = -2B_z$

$\frac{9}{-2} = B_z$

$B_z = -4.5$

$2\hat{\jmath} = (3B_x - 5(-4.5))\hat{\jmath}$

$= 2 - 22.5 = -3B_x$

$\frac{-20.5}{-3} = B_x$

$B_x = -6.83$

$C_z\hat{k} = (15 + 2(-6.83))\hat{k}$

$C_z = 15 - 13.66$

$C_z = 1.34$

53) Encuentre un vector unitario que señale hacia una posición a mitad de camino entre los dos vectores de posición $4\hat{\imath} + 2\hat{\jmath}$ y $-\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$

Datos

$\vec{A} = 4\hat{\imath} + 2\hat{\jmath}$

$\vec{B} = -\hat{\imath} + 3\hat{\jmath} + 2\hat{k}$

$\frac{\vec{A} + \vec{B}}{2} = \frac{3\hat{\imath}}{2} + \frac{5\hat{\jmath}}{2} + \frac{2}{2}\hat{k} = 1.5\hat{\imath} + 2.5\hat{\jmath} + \hat{k}$

$|\vec{U}| = \sqrt{1.5^2 + 2.5^2 + 1^2}$

$= 3.08$

$\vec{U} = \frac{1.5\hat{\imath}}{3.08} + \frac{2.5\hat{\jmath}}{3.08} + \frac{1\hat{k}}{3.08} = 0.18\hat{\imath} + 0.81\hat{\jmath} + 0.32\hat{k}$

59)

Datos

$A = 2\hat{\imath} - 3\hat{\jmath} + 2\hat{k}$

$B = -3\hat{\imath} + 4\hat{k}$

$A \times B \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ 2 & -3 & 2 \\ -3 & 0 & 4 \\ \hat{\imath} & \hat{\jmath} & \hat{k} \\ 2 & -3 & 2 \end{vmatrix} = -12\hat{\imath} - 6\hat{\jmath} - 9\hat{k} - 8\hat{\jmath}$

$= -12\hat{\imath} - 14\hat{\jmath} - 9\hat{k}$

63) Demostrar que $A\times(B\times C) = B(A\cdot C) - C(A\cdot B)$

$$A\times[(B_yC_z - B_zC_y)\hat{\imath} + (B_zC_x - B_xC_z)\hat{\jmath} + (B_xC_y - B_yC_x)\hat{k}]$$

$$= [A_yB_xC_y - A_yB_yC_x - A_zB_zC_x + A_zB_xC_z]\hat{\imath} + [A_zB_yC_z - A_zB_zC_y - A_xB_xC_y + A_xB_yC_x]\hat{\jmath} + [A_xB_zC_x - A_xB_xC_z - A_yB_yC_z + A_yB_zC_y]\hat{k}$$

$$B(A_xC_x + A_yC_y + A_zC_z) - C(A_xB_x + A_yB_y + A_zB_z)$$

$$= (\cancel{A_xB_xC_x} + A_yB_xC_y + A_zB_xC_z - \cancel{A_xB_xC_x} - A_yB_yC_x - A_zB_zC_x)\hat{\imath}$$
$$+ (A_xB_yC_x + \cancel{A_yB_yC_y} + A_zB_yC_z - A_xB_xC_y - \cancel{A_yB_yC_y} - A_zB_zC_y)\hat{\jmath}$$
$$+ (A_xB_zC_x + A_yB_zC_y + \cancel{A_zB_zC_z} - A_xB_xC_z - A_yB_yC_z - \cancel{A_zB_zC_z})\hat{k}$$

$$\therefore A\times(B\times C) = B(A\cdot C) - C(A\cdot B)$$

75)

Datos

$A = 50m, 30°\ EN = 60°$

$B = 35m, 70°\ WN = 160°$

$A_x = 50\cos 60° = 25m$

$A_y = 50\operatorname{Sen} 60° = 43.30m$

$B_x = 35\cos 160° = -32.88m$

$B_y = 35\operatorname{Sen} 160° = 11.97m$

$$A\cdot B = (25)(-32.88) + (43.30)(11.97)$$
$$= -822 + 518.301$$
$$= -303.699 m^2$$

77) Componente B a lo largo de A

Datos

$\vec{A} = 3\hat{\imath} + 4\hat{\jmath}$

$\vec{B} = \hat{\imath} + 3\hat{\jmath} - 2\hat{k}$

$\vec{B_A} = ?$

$$|\vec{A}| = \sqrt{3^2+4^2} = 5$$

$$\hat{U}_A = \frac{\vec{A}}{|\vec{A}|} = \frac{3\hat{\imath}+4\hat{\jmath}}{5} = 0.6\hat{\imath} + 0.8\hat{\jmath}$$

$$|\vec{B_A}| = B\cdot\hat{U}_A = (\hat{\imath} + 3\hat{\jmath} - 2\hat{k})\cdot(0.6\hat{\imath} + 0.8\hat{\jmath})$$
$$= 0.6 + 2.4 = 3$$