

1= Sean $C = 6\vec{i} + 3\vec{j}$ y $D = 5\vec{i} + 4\vec{j} - 3\vec{k}$ dos vectores en tres dimensiones, calcule la proyección escalar sobre de D sobre C, la proyección vectorial y el ángulo entre ellos

$$C = 6\vec{i} + 3\vec{j} = \langle 6, 3, 0 \rangle$$

$$D = 5\vec{i} + 4\vec{j} - 3\vec{k} = \langle 5, 4, -3 \rangle$$

$$D \cdot C = \langle 5 + 4 - 3 \rangle = \langle 6 + 3 + 0 \rangle$$

$$D \cdot C = 30 + 12 + 0 = 42$$

$$|C| = \sqrt{(6)^2 + (3)^2 + (0)^2}$$

$$|C| = \sqrt{45}$$

$$|P_{D/C}| = \frac{42}{\sqrt{45}} = 6.2609$$

$$\vec{P}_{D/C} = \frac{D \cdot C}{|C|^2} \cdot \vec{C}$$

$$\vec{P}_{D/C} = \frac{42}{45} \cdot \langle 6 + 3 + 0 \rangle = \left\langle \frac{252}{45}, \frac{126}{45}, 0 \right\rangle$$

Problema 1

$$\cos \theta = \frac{D \cdot C}{|D| \cdot |C|}$$

$$\cos \theta = \frac{42}{\sqrt{50} \cdot \sqrt{45}}$$

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

$$|D| = \sqrt{50}$$

$$\cos \theta = \frac{42}{47.4341}$$

$$\theta = \cos^{-1} \left(\frac{42}{47.4341} \right)$$

$$\theta = 27.6945^\circ$$

Problema 2

2= Calcule el volumen del paralelepípedo con aristas adyacentes PQ, PR, PS

$$P(3, 0, 1), Q(-1, 2, 5), R(5, 1, -1) \text{ y } S(0, 4, 2)$$

$$PQ = (-1-3), (2-0), (5-1) = \langle -4, 2, 4 \rangle$$

$$PR = (5-3), (1-0), (-1-1) = \langle 2, 1, -2 \rangle$$

$$PS = (0-3), (4-0), (2-1) = \langle -3, 4, 1 \rangle$$

$$V = |(\overrightarrow{PR} \times \overrightarrow{PS}) \cdot \overrightarrow{PQ}|$$

$$\overrightarrow{PR} \times \overrightarrow{PS} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 1 & -2 \\ -3 & 4 & 1 \end{vmatrix}$$

$$[(2)(1) - (-4)]\hat{i} - [(2)(1) - (-3)](-2)\hat{j} + [(2)(4) - (-3)]\hat{k}$$

$$= 9\hat{i} + 4\hat{j} + 11\hat{k}$$

$$V = \langle 9, 4, 11 \rangle \cdot \langle -4, 2, 4 \rangle$$

$$= (9)(-4) + (4)(2) + (11)(4)$$

$$V = -36 + 8 + 44 = 16 \text{ u}^3$$

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Problema 3

Dado el vector de posición de una partícula en movimiento grafique una porción de la curva y el vector tangente en el valor indicado de t .

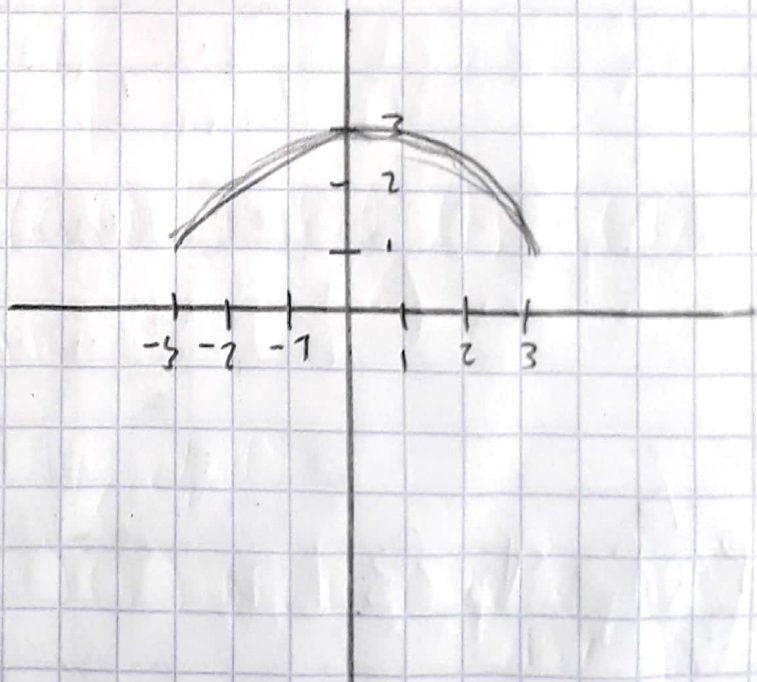
$$r(t) = (\cos 3t)\mathbf{i} + (\sin 3t)\mathbf{j} \quad t = \pi/3$$

$$r'(\pi/3) = \langle -3\sin(\pi/3), 3\cos(\pi/3) \rangle = \langle -2.59, 1.5 \rangle$$

$$r'(\pi/6) = \langle -3\sin(\pi/6), 3\cos(\pi/6) \rangle = \langle -1.5, 2.59 \rangle$$

$$r'(0) = \langle -3\sin(0), 3\cos(0) \rangle = \langle 0.00, 3 \rangle$$

t	$r(t)$
$\pi/3$	$\langle -2.59, 1.5 \rangle$
$\pi/6$	$\langle -1.5, 2.59 \rangle$
0	$\langle 0, 3 \rangle$
$\pi/3$	$\langle -2.59, 1.5 \rangle$



Problema 4

Calcular la distancia de la recta $r(t) = (t+7)\mathbf{i} + (t-2)\mathbf{j} + \left(\frac{3t}{4} - 6\right)\mathbf{k}$ al origen

$$Q = (0, 0, 0)$$

$$v = \langle 1, 1, \frac{3}{4} \rangle$$

$$P_0 = (t+7, t-2, \frac{3t}{4} - 6)$$

$$\overrightarrow{PQ} = \langle 0 - (t+7), 0 - (t-2), 0 - \left(\frac{3t}{4} - 6\right) \rangle$$

$$\overrightarrow{PQ} = \langle 0 - t - 7, 0 - t + 2, 0 - \frac{3t}{4} + 6 \rangle$$

$$\overrightarrow{PQ} = \langle -7 - t, -t + 2, -\frac{3t}{4} + 6 \rangle$$

$$PQ \cdot v = 0$$

$$[(1)(-t-7)] + [(1)(-t+2)] + \left[\left(\frac{3}{4}\right)\left(-\frac{3t}{4} + 6\right)\right] = 0$$

$$-t-7 - t+2 - \frac{9t}{16} + \frac{18}{4} = 0$$

$$-2t - \frac{9t}{16} - 5 + \frac{18}{4} = 0$$

$$\frac{-2t}{1} - \frac{9t}{16} = \frac{-32t - 9t}{16} = \frac{-41t}{16} \quad \frac{-5}{1} + \frac{18}{4} = \frac{-20 + 18}{4} = \frac{-2}{4}$$

$$\frac{-41t}{16} - \frac{2}{4} = 0 \quad t = \frac{16 \cdot \left(\frac{2}{4}\right)}{-41} = \frac{8}{-41} = -0.1951$$

Problema 4

$$\vec{PQ} = \langle -7-t, -t+2, \frac{3t}{4}+6 \rangle$$

$$\vec{PQ} = \langle -7 - \left(-\frac{8}{41}\right), -\left(-\frac{8}{41}\right) + 2, \frac{3\left(-\frac{8}{41}\right)}{4} + 6 \rangle$$

$$\vec{PQ} = \langle -7 + \frac{8}{41}, +\frac{8}{41} + 2, \frac{-\frac{24}{41}}{4} + 6 \rangle$$

$$\vec{PQ} = \langle -\frac{279}{41}, \frac{90}{41}, -\frac{24}{164} + 6 \rangle$$

$$\vec{PQ} = \langle -\frac{279}{41}, \frac{90}{41}, +\frac{240}{41} \rangle$$

$$|\vec{PQ}| = \sqrt{\left(-\frac{279}{41}\right)^2 + \left(\frac{90}{41}\right)^2 + \left(\frac{240}{41}\right)^2}$$

$$|\vec{PQ}| = 9.2347$$

6 = Determine la ecuación del plano que contiene los puntos $P(1, 0, -1)$, $Q(2, 4, 5)$ y $R(3, 1, 7)$

$$PQ = (2-1), (4-0), (5+1) = \langle 1, 4, 6 \rangle$$

$$PR = (3-1), (1-0), (7+1) = \langle 2, 1, 8 \rangle$$

$$N = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 4 & 6 \\ 2 & 1 & 8 \end{vmatrix}$$

$$PQ \times PR = \begin{vmatrix} 4 & 6 \\ 1 & 8 \end{vmatrix} \hat{i} - \begin{vmatrix} 1 & 6 \\ 2 & 8 \end{vmatrix} \hat{j} + \begin{vmatrix} 1 & 4 \\ 2 & 1 \end{vmatrix} \hat{k}$$

$$N = [32-6]\hat{i} - [8-12]\hat{j} + [1-8]\hat{k}$$

$$\vec{N} = 26\hat{i} + 4\hat{j} - 7\hat{k}$$

$$\vec{r} = (x, y, z) - (1, 0, -1)$$

$$= \langle x-1, y-0, z+1 \rangle$$

$$PT \cdot N = \langle x-1, y-0, z+1 \rangle \cdot \langle 26, 4, -7 \rangle = 0$$

$$= (x-1)(26) + (y-0)(4) + (z+1)(-7) = 0$$

$$26x - 26 + 4y - 7z - 7 = 0$$

$$26x + 4y - 7z = 33$$

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Primer Parcial multivariable

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