Examen Primer Parcial C.M

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1: Sea $C = 6i + 3j$ y $D = 5i + 4j - 3k$ dos vectores en 3 dimensiones, calcule la proyección vectorial y el angulo entre ellos.

$C = \langle 6, 5, 0 \rangle \quad D = \langle 5, 4, -3 \rangle$

$|P\%_C| = \frac{D \cdot C}{C}$

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

$= \langle 30 + 12 + 0 \rangle = 42$

$|P\%_C| = \frac{42}{3\sqrt{5}}$

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

$= 3\sqrt{5}$

$D = \sqrt{(5)^2 + (4)^2 + (-3)^2} = 5\sqrt{2}$

$P\%_C = \frac{D \cdot C}{|C|^2} \cdot C = \frac{42}{(3\sqrt{5})^2} \cdot \langle 6, 3, 0 \rangle$

$= \frac{42}{45} \cdot \langle 6, 3, 0 \rangle$

$= \langle \frac{28}{5}, \frac{14}{5}, 0 \rangle$

$\theta = \cos^{-1} \frac{D \cdot C}{|D| \cdot |C|}$

$= \cos^{-1} \frac{42}{(3\sqrt{2})(3\sqrt{5})}$

$= 27.6945$ Angulo

2: Calcule el Paralelepipedo con aristas adyasente PQ ; PR ; PS P(3,0,1) Q(-1,2,5) R(5,1,-1) S(0,4,2)

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

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

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

$\overrightarrow{PQ} = \langle -4, 2, 4 \rangle$ $\overrightarrow{PR} \langle 2, 1, -2 \rangle$ $\overrightarrow{PS} = \langle -3, 4, 1 \rangle$

Altura — Base.

$$PR \times PS = \begin{vmatrix} i & j & k \\ 2 & 1 & -2 \\ -3 & 4 & 1 \end{vmatrix} = (1 \cdot 1) - (-2 \cdot 4)\,i - (2 \cdot 1)(-2 \cdot -3)\,j + (2 \cdot 4) - (1 \cdot -3)\,k$$

$$= +9i + 4j + 11k$$

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

$$= (-36 + 8 + 44)$$

$$V = 16\ u^3$$

3: Dado al vector de posicion de una particula en movimiento, Grafique una porcion de la curva y el vector tangente en el valor indicado de t.

$r(t) = (\cos 3t)\,i + (\sen 3t)\,j$; $t = (\pi/3)$

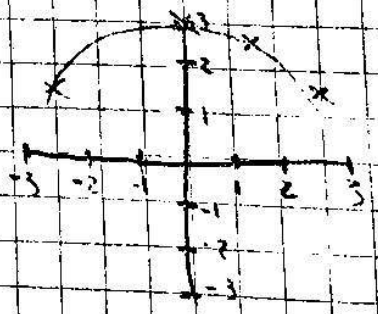
$r'(t) = \langle -3 \sen t, +3 \cos t \rangle$

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

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

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

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



4. $r(t) = (t+7)i + (t-2)j + \left(\frac{3t}{4} - 6\right)k$ $\quad P_0\left(t+7, t-2, \frac{3t}{4} - 6\right)$

$Q = (0,0,0)$ $\quad v = \langle 1, 1, 3/4 \rangle$

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

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

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

$\overrightarrow{PQ} \cdot v = 0$

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

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

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

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

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

$\overrightarrow{PQ} = \langle -7 - t, -1 - 2, \frac{3t}{4} + 6 \rangle$

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

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

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

$= \langle -\frac{279}{41}, \frac{90}{41}, \frac{246}{41} \rangle$

$\overrightarrow{PQ} = \sqrt{\left(-\frac{279}{41}\right)^2 + \left(\frac{90}{41}\right)^2 + \left(\frac{246}{41}\right)^2}$

$\overrightarrow{PQ} = 9.2347$

6. $P(1,0,-1)\ Q(2,4,5)\ R(3,1,7)$

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

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

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

$$32 - 6 \qquad -8 - 12 \qquad +1 - 8$$

$$= 26i + 4j - 7k$$

$n = \langle 26, 4, -7 \rangle$

$\overrightarrow{PT} \times \vec{n} = 0$

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

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

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

$26x + 4y - 7z - 33 = 0$

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