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Be diligent

No.
Date.

Jawaban Soal 1

1. Dik Vektor $u = (2, -2, 1)$ dan $v = (2, 1, 2)$. tentukan dan Tunjukan dgn rinci Proses perhitungan dari Soal berikut:

a. $u \cdot v$ (hasil kali titik Vektor u dan v)

b. Sudut antara Vektor u dan v

c. Jarak antara Vektor u dan v

d. $u \times v$ (Hasil kali silang Vektor u dan v)

e. $\|u \times v\|$

a) $u \cdot v = u_1v_1 + u_2v_2 + u_3v_3$
$= 2.2 + (-2).(1) + 1.2$
$= 4 - 2 + 2$
$= 4$

b) $\cos\theta = \frac{u \cdot v}{\|u\|\|v\|}$
$= \frac{4}{3.3} = 4/9$

$\|u\| = \sqrt{4+4+1} = 3$
$\|v\| = \sqrt{4+1+4} = 3$

$\theta = 63,61^\circ$

$\cos\theta = 4/9$
$\theta = \cos^{-1} 4/9$

c) $\|u - v\| = \sqrt{(2-2)^2 + (-2-1)^2 + (1-2)^2}$
$\|u - v\| = \sqrt{0 + 9 + 1}$
$= \sqrt{10}$

Jarak antara u dan v adalah $\sqrt{10} = 3,16$

d) $u \times v = \begin{vmatrix} A & B & C \\ 2 & -2 & 1 \\ 2 & 1 & 2 \end{vmatrix}$

$= A(2\times2 - 1\times1) - B(2\times2 - 2\times1) + C(2\times1 - 2\times-2)$
$= A(4-1) - B(4-2) + C(2-(-4))$

$A(3) - B(2) + C(6)$

$= 3A - 2B + 6C$

Jadi untuk, $U \times V = (3, -2, 6)$

8) $\|U \times V\| = \sqrt{(3)^2 + (-2)^2 + (6)^2}$

$\|U \times V\| = \sqrt{9 + 4 + 36}$

$\|U \times V\| = \sqrt{49}$

$\|U \times V\| = 7$

Jadi $\|U \times V\| = 7$

2. $a = (1, k, k^2)$ $b = (-2, -1, 1)$

a) k agar vektor a dan b tegak lurus

ⓐ $\bar{a} \cdot \bar{b} = 0$

$$\begin{vmatrix} 1 \\ k \\ k^2 \end{vmatrix} \times \begin{vmatrix} -2 \\ -1 \\ 1 \end{vmatrix} = 0 \rightarrow \begin{vmatrix} -2 \\ -k \\ k^2 \end{vmatrix} = 0 \rightarrow$$

$-2 - k + k^2 = 0$

$k^2 - k - 2 = 0$

$(k+1)(k-2)$

$k = -1 \vee k = 2$

b) $\|a \times b\|$ k pos

$a = (1, 2, 4)$

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

$$a \times b = \left(\begin{vmatrix} 2 & 4 \\ -1 & 1 \end{vmatrix}, - \begin{vmatrix} 1 & 4 \\ -2 & 1 \end{vmatrix}, \begin{vmatrix} 1 & 2 \\ -2 & -1 \end{vmatrix} \right)$$

$= (6, -9, 3)$

$\|a \times b\| = \sqrt{6^2 + (-9)^2 + 3^2}$

$= \sqrt{36 + 81 + 9}$

$= \sqrt{126}$

$= 3\sqrt{14}$

3. $u = (k+1, k+1, 1)$

$v = (-k, -1, -k-1, k)$ adalah $180°$

$a \cos(x) = 180°$

$x = \cos 180$ $\cos 180$

$x = -1$

$a \text{ cross } \left(\frac{u.v}{\|u\|\|v\|}\right)$

$u.v = (k+1)(-k+1) + (k+1)(-k-1) + (1)(k)$

$= -k^2 - 2k - 1 + -k^2 - 2k - 1 + k$

$= -2k^2 - 3k - 2$

$\|u\| = \sqrt{(k+1)^2 + (k+1)^2 + 1^2}$

$= \sqrt{2k^2 + 4k + 3}$

$\|v\| = \sqrt{(-k-1)^2 + (-k-1)^2 + k^2}$

$= \sqrt{3k^2 + 4k + 2}$

$\|u\|.\|v\| = \sqrt{2k^2+4k+3} \cdot \sqrt{3k^2+4k+2}$

$= \sqrt{6k^4 + 20k^3 + 29k^2 + 20k + 6}$

$\frac{-2k^2 - 3k - 2}{\sqrt{6k^4 + 20k^3 + 29k^2 + 20k + 6}} = -1$

misal $x = k$

$-2x^2 - 3x - 2 = -\sqrt{6x^4 + 20x^3 + 29x^2 + 20x + 6}$

$(2x^2 + 3x + 2)^2 = \left(\sqrt{6x^4 + 20x^3 + 29x^2 + 20x + 6}\right)^2$

$4x^4 + 9x^2 + 4 + 12x^3 + 8x^2 + 12x = 6x^4 + 20x^3 + 29x^2 + 20x + 6$

$6x^4 + 20x^3 + 29x^2 + 20x + 6 - 4x^4 - 17x^2 - 4 - 12x^3 - 12x = 0$

$2x^4 + 8x^3 + 12x^2 + 8x + 2 = 0$

$2(x^4 + 4x^3 + 6x^2 + 4x + 1) = 0$

$2(x^4 + x^3 + 3x^3 + 3x^2 + 3x^2 + 3x + x + 1) = 0$

$2(x^3(x+1) + 3x^2(x+1) + 3x(x+1) + (1(x+1))) = 0$

$2((x+1)(x^3 + 3x^2 + 3x + 1)) = 0$

$2((x+1)(x+1)^3) = 0$

$\frac{2(x+1)^4}{2} = \frac{0}{2} = (x+1)^4 = 0$

$x + 1 = 0$

$x = -1$

karna $x = k$, $k = -1$