Tugas Pertemuan 5
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1. Diket = $u = (2, -2, 1)$, $v = (2, 1, 2)$
Ditanya dan dijawab:
a. $u \cdot v = (2)(2) + (-2)(1) + (1)(2)$
$= 4 - 2 + 2 = 4$

b. Sudut antara vector u dan v = $\cos \theta = \frac{u \cdot v}{\|u\| \|v\|}$

$\|u\| = \sqrt{(2)^2 + (-2)^2 + 1^2} = \sqrt{9} = 3$
$\|v\| = \sqrt{2^2 + 1^2 + 2^2} = \sqrt{9} = 3$

$\cos \theta = \frac{4}{3 \cdot 3} = \frac{4}{9}$

$\theta = \cos^{-1}\left(\frac{4}{9}\right)$
$\theta = 63,615°$

c. jarak antara vector u dan v

$d = \sqrt{(2-2)^2 + (1+2)^2 + (2-1)^2} = \sqrt{0 + 9 + 1} = \sqrt{10}$

d. $u \times v = \left(\begin{vmatrix} -2 & 1 \\ 1 & 2 \end{vmatrix}, -\begin{vmatrix} 2 & 1 \\ 2 & 2 \end{vmatrix}, \begin{vmatrix} 2 & -2 \\ 2 & 1 \end{vmatrix}\right) = ((-4-1), -(4-2), (2+4))$
$= (-5, -2, 6)$

e. $\|u \times v\|$: $u \times v = (-5, -2, 6)$
$\|u \times v\| = \sqrt{(-5)^2 + (-2)^2 + 6^2}$
$= \sqrt{25 + 4 + 36}$
$= \sqrt{65}$

2. Diket = $a = (1, k, k^2)$, $b = (-2, -1, 1)$
Ditanya dan dijawab:
a. nilai k agar vector a dan b tegak lurus
-> $\theta = 90°$
$\cos 90° = 0$
$0 = \frac{u \cdot v}{\|u\| \|v\|}$
$0 = u \cdot v$

-> $u \cdot v = (1)(-2) + (k)(-1) + (k^2)(1) = 0$
$= -2 - k + k^2 = 0$
$k^2 - k - 2 = 0$
$(k-2)(k+1)$
$k = 2 \quad k = -1$

$-2 = -2 \times 1$
$-1 = -2 + 1$

b. $\|a \times b\|$ untuk k positif
$a = (1, 2, 4)$
$b = (-2, -1, 1)$
$a \times b = \left(\begin{vmatrix} 2 & 4 \\ -1 & 1 \end{vmatrix}, -\begin{vmatrix} 1 & 4 \\ -2 & 1 \end{vmatrix}, \begin{vmatrix} 1 & 2 \\ -2 & -1 \end{vmatrix}\right) = ((2+4), -(1+8), (-1+4))$
$= (6, -9, 3)$

$\|a \times b\| = \sqrt{6^2 + (-9)^2 + 3^2}$
$= \sqrt{36 + 81 + 9} = \sqrt{126} = 3\sqrt{14}$

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

$v = (-k-1, -k-1, k)$

ditanya : k agar sudut $180°$

dijawab : $\theta = 180$

$\cos 180 = -1$

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

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

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

$$-1 = \frac{-2k^2 - 4k - 2 + k}{\sqrt{(2k^2 + 4k + 3)(3k^2 + 4k + 2)}}$$

$$-\sqrt{(6k^4 + 8k^3 + 4k^2 + 12k^3 + 16k^2 + 8k + 9k^2 + 12k + 6)} = -2k^2 - 3k - 2$$

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

$$6k^4 + 20k^3 + 29k^2 + 20k + 6 = (2k^2 + 3k + 2)^2$$

$$6k^4 + 20k^3 + 29k^2 + 20k + 6 = 4k^4 + 6k^3 + 4k^2 + 6k^3 + 9k^2 + 6k + 4k^2 + 6k + 4$$

$$6k^4 + 20k^3 + 29k^2 + 20k + 6 = 4k^4 + 12k^3 + 17k^2 + 12k + 4$$

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

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

$$k^4 + 4k^3 + 6k^2 + 4k + 1 = 0$$

	1	4	6	4	1
-1		-1	-3	-3	-1
	1	3	3	1	0
-1		-1	-2	-1	
	1	2	1	0	

$-1k = -1$

$-1k = -1$

$k = -1$

$k^2 + 2k + 1$

$(k+1)(k+1)$

$k = -1 \quad k = -1$