Latihan Soal 1

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1) Diketahui vektor m dan n
Vektor $m = (5, -2, 1)$
Vektor $n = (-6, -2, 4)$

a) Tentukan vektor p dimana
$p = -2m + 0.5n$

$$P = -2(m) + 0.5(n)$$
$$= -2(5, -2, 1) + 0.5(-6, -2, 4)$$
$$= (-10, 4, -2) + (-3, -1, 2)$$
$$= (-13, 3, 0)$$

b) Tentukan sudut antara vektor m dan n

$$m \cdot n = M_x n_x + M_y n_y + M_z n_z$$
$$m \cdot n = \|m\| \|n\| \cdot \cos\theta$$

$$(5 \cdot -6) + (-2 \cdot -2) + (1 \cdot 4) = \|m\| \|n\| \cos\theta$$
$$-30 + 4 + 4 = \|m\| \|n\| \cos\theta$$
$$-22 = \|m\| \|n\| \cos\theta$$
$$-22 = \sqrt{30} \cdot 2\sqrt{14} \cos\theta$$
$$\frac{-11}{\sqrt{30}\sqrt{14}} = \cos\theta = \frac{-11\sqrt{105}}{210}$$

$$\text{arc cos}\left(\frac{-11\sqrt{105}}{210}\right) = 2,13^\circ$$

c) Tentukan proyeksi skalar dan vektor m terhadap n

$$\text{proj}_n \, m = \frac{m \cdot n}{\|m\|^2} \cdot m$$
$$= \frac{-22}{30}(5, -2, 1)$$

$$\text{Comp}_n \, m = \frac{m \cdot n}{\|m\|} = \frac{-22}{\sqrt{30}}$$

2) Tentukan determinan dari M

$$M \begin{vmatrix} -5 & 3 & 1 \\ 2 & 1 & 1 \\ -4 & 3 & 1 \end{vmatrix}$$

Menggunakan cara Sarrus

$$|M| = \begin{vmatrix} -5 & 3 & 1 \\ 2 & 1 & 1 \\ -4 & 3 & 1 \end{vmatrix} \begin{matrix} -5 & 3 \\ 2 & 1 \\ -4 & 3 \end{matrix}$$

$$(-5 \cdot 1 \cdot 1) + (3 \cdot 1 \cdot -4) + (1 \cdot 2 \cdot 3)$$
$$- (1 \cdot 1 \cdot -4) - (-5 \cdot 1 \cdot 3) - (3 \cdot 2 \cdot 1)$$

$$|M| = -5 - 12 + 6 + 4 + 15 - 6$$
$$= 10 - 8$$
$$= 2$$

Latihan Soal 2

1) Diberikan vektor $u = (1, 0, 0)$ dan $v = (0, 12, 0)$
$u \times v$ dan $\| u \times v \|$

$$u \times v = \begin{vmatrix} i & j & k \\ 1 & 0 & 0 \\ 0 & 12 & 0 \end{vmatrix} = \begin{vmatrix} 0 & 0 \\ 12 & 0 \end{vmatrix} i - \begin{vmatrix} 1 & 0 \\ 0 & 0 \end{vmatrix} j$$
$$+ \begin{vmatrix} 1 & 0 \\ 0 & 12 \end{vmatrix} k$$

$$= -12i - j + 12k$$

$$\| u \times v \| = \sqrt{(-12)^2 + (-1)^2 + (12)^2}$$
$$= \sqrt{144 + 1 + 144} = \sqrt{289} = 17$$

Latihan Soal 3

1. Tentukan matriks inverse

$$B = \begin{pmatrix} 1 & 2 & 2 \\ 2 & -1 & 1 \\ 1 & 3 & 2 \end{pmatrix}$$

$$B^{-1} = \frac{1}{|B|} \, Adj(B)$$

$$|B| = \begin{vmatrix} 1 & 2 & 2 \\ 2 & -1 & 1 \\ 1 & 3 & 2 \end{vmatrix} \begin{vmatrix} 1 & 2 \\ 2 & -1 \\ 1 & 3 \end{vmatrix}$$

$$|B| = (-2) + (2) + (12) - (-2) - (3) - (8)$$

$$|B| = 12 + 2 - 3 - 8 = 3$$

$$Adj(B) = C^{T}$$

$$B = \begin{vmatrix} 1 & 2 & 2 \\ 2 & -1 & 1 \\ 1 & 3 & 2 \end{vmatrix} \qquad C^{T} = \begin{pmatrix} -5 & -2 & 4 \\ 3 & 0 & -3 \\ 7 & 1 & -5 \end{pmatrix}$$

$$C = \begin{vmatrix} -5 & 3 & 7 \\ -2 & 0 & 1 \\ 4 & -3 & -5 \end{vmatrix}$$

$$|B| = \frac{1}{3} \qquad Adj(B) = \frac{1}{3} \begin{pmatrix} -5 & -2 & 4 \\ 3 & 0 & -3 \\ 7 & 1 & -5 \end{pmatrix}$$

$$= \begin{pmatrix} -5/3 & -2/3 & 4/3 \\ 1 & 0 & -1 \\ -7/3 & 1/3 & -5/3 \end{pmatrix},$$