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NOMOR I

1. tentukan a, b dan c

a. $\begin{bmatrix} 5 & 2a-6 \\ 3b & 4 \end{bmatrix} = \begin{bmatrix} 5 & 2b \\ 6 & 4 \end{bmatrix}$

jawab

$3b = 6$

$b = \frac{6}{3}$

$b = 2$

$2a - 6 = 2b$

$2a - 6 = 2(2)$

$2a - 6 = 4$

$2a = 4 + 6$

$a = \frac{10}{2}$

$a = 5$

b. $\begin{bmatrix} \frac{10}{b} & 2c \\ a-2 & bd \end{bmatrix} = \begin{bmatrix} -a & -6 \\ c & 8 \end{bmatrix}$

jawab

$2c = -6$

$c = -\frac{6}{2}$

$c = -3$

$a - 2 = c$

$a - 2 = -3$

$a = -3 + 2$

$a = -1$

$\frac{10}{b} = -a$

$\frac{10}{b} = -1$

$b = 10 \times -1$

$b = -10$

$bd = 8$

$-10d = 8$

$d = \frac{8}{-10}$

$d = -\frac{4}{5}$

c. $\begin{bmatrix} -3 & a \\ b+1 & \frac{d}{2} \end{bmatrix} = \begin{bmatrix} \frac{c}{b} & d-3 \\ a-2 & 5 \end{bmatrix}$

jawab

$\frac{d}{2} = 5$

$d = 5 \times 2$

$d = 10$

$a = d - 3$

$a = 10 - 3$

$a = 7$

$b + 1 = a - 2$

$b + 1 = 7 - 2$

$b + 1 = 5$

$b = 5 - 1$

$b = 4$

d. $\begin{bmatrix} a+c & 3b+4d \\ -b+3d & 2a-c \end{bmatrix} = \begin{bmatrix} 1 & 15 \\ 8 & 5 \end{bmatrix}$

Jawab

$a + c = 1$

$a = 1 - c$

$2a - c = 5$

$2(1-c) - c = 5$

$2 - 2c - c = 5$

$2 - 3c = 5$

$-3c = 5 - 2$

$-3c = 3$

$c = \frac{3}{-3}$

$c = -1$

$a + c = 1$

$a - 1 = 1$

$a = 1 + 1$

$a = 2$

$3b + 4d = 15$

$3b = 15 - 4d$

$b = \frac{15-4d}{3}$

$-b + 3d = 8$

$-\left(\frac{15-4d}{3}\right) + 3d = 8$

$\frac{-15+4d}{3} + \frac{9d}{3} = 8$

$-5 + \frac{9d}{3} = 8$

$$\frac{9d}{3} = 8 + 5$$
$$\frac{9d}{3} = 13$$
$$9d = 13 \times 3$$
$$9d = 39$$
$$d = \frac{39}{9}$$

$$3b + 4d = 15$$
$$3b + 4\left(\frac{39}{9}\right) = 15$$
$$3b + \frac{52}{3} = 15$$
$$3b = 15 - \frac{52}{3}$$
$$b = \frac{\frac{45}{3} - \frac{52}{3}}{3}$$
$$b = \frac{-\frac{7}{3}}{3}$$
$$b = -\frac{7}{9}$$

2. tentukan transpose dari:

a. $A = \begin{bmatrix} -1 & 2 & 3 \\ 4 & 5 & 0 \end{bmatrix}$

$A^T = \begin{bmatrix} -1 & 4 \\ 2 & 5 \\ 3 & 0 \end{bmatrix}$

b. $B = \begin{bmatrix} 4 & 2 & 1 \\ 5 & 0 & 3 \\ -1 & 2 & 5 \end{bmatrix}$

$B^T = \begin{bmatrix} 4 & 5 & -1 \\ 2 & 0 & 2 \\ 1 & 3 & 5 \end{bmatrix}$

NOMOR II

1. tentukan matrix x

a. $2X = \begin{bmatrix} 4 & -6 \\ 10 & 8 \end{bmatrix}$

$$X = \frac{1}{2}\begin{bmatrix} 4 & -6 \\ 10 & 8 \end{bmatrix}$$
$$= \begin{bmatrix} \frac{4}{2} & -\frac{6}{2} \\ \frac{10}{2} & \frac{8}{2} \end{bmatrix}$$
$$= \begin{bmatrix} 2 & -3 \\ 5 & 4 \end{bmatrix}$$

b. $2X + \begin{bmatrix} 3 & -2 \\ 5 & 4 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 3 & 0 \end{bmatrix}$

$2X = \begin{bmatrix} 7 & 6 \\ 3 & 0 \end{bmatrix} - \begin{bmatrix} 3 & -2 \\ 5 & 4 \end{bmatrix}$

$2X = \begin{bmatrix} 4 & 8 \\ -2 & -4 \end{bmatrix}$

$X = \frac{1}{2}\begin{bmatrix} 4 & 8 \\ -2 & -4 \end{bmatrix}$

$= \begin{bmatrix} 2 & 4 \\ -1 & -2 \end{bmatrix}$

c. $2X - \begin{bmatrix} 5 & 1 \\ 10 & 0 \end{bmatrix} = \begin{bmatrix} 1 & -3 \\ 2 & 4 \end{bmatrix}$

$2X = \begin{bmatrix} 1 & -3 \\ 2 & 4 \end{bmatrix} + \begin{bmatrix} 5 & 1 \\ 10 & 0 \end{bmatrix}$

$2X = \begin{bmatrix} 6 & -2 \\ 12 & 4 \end{bmatrix}$

$X = \frac{1}{2}\begin{bmatrix} 6 & -2 \\ 12 & 4 \end{bmatrix}$

$= \begin{bmatrix} 3 & -1 \\ 6 & 4 \end{bmatrix}$

d. $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} = \frac{1}{2}X - \begin{bmatrix} 0 & -3 \\ \frac{1}{2} & -1 \end{bmatrix}$

$\frac{1}{2}X = \begin{bmatrix} 0 & -3 \\ \frac{1}{2} & -1 \end{bmatrix} + \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$

$\frac{1}{2}X = \begin{bmatrix} 1 & -3 \\ \frac{1}{2} & -2 \end{bmatrix}$

$X = 2\begin{bmatrix} 1 & -3 \\ \frac{1}{2} & -2 \end{bmatrix}$

$= \begin{bmatrix} 2 & -6 \\ 1 & -4 \end{bmatrix}$

2. tentukan a, b, c dan d:

a. $2\begin{bmatrix} a & 2 \\ 1 & d \end{bmatrix} + 3\begin{bmatrix} -1 & b \\ c & -3 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 4 & -5 \end{bmatrix}$

$\begin{bmatrix} 2a & 4 \\ 2 & 2d \end{bmatrix} + \begin{bmatrix} -3 & 3b \\ 3c & -9 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 4 & -5 \end{bmatrix}$

$2a - 3 = 5$

$2a = 5 + 3$

$2a = 8$

$a = \frac{8}{2}$

$a = 4$

$4 + 3b = 7$

$3b = 7 - 4$

$3b = 3$

$b = \frac{3}{3}$

$b = 1$

$2 + 3c = 4$

$3c = 4 - 2$

$3c = 2$

$c = \frac{2}{3}$

$2d - 9 = -5$

$2d = -5 + 9$

$2d = 4$

$d = \frac{4}{2}$

$d = 2$

b. $4\begin{bmatrix} a+1 & c \\ b & 3a \end{bmatrix} - \frac{1}{2}\begin{bmatrix} 4b & 8d+2 \\ 2c+4 & 6 \end{bmatrix} = 3\begin{bmatrix} b-2 & c \\ -4 & 6 \end{bmatrix}$

$\begin{bmatrix} 4a+4 & 4c \\ 4b & 12a \end{bmatrix} - \begin{bmatrix} 2b & 4d+1 \\ c+2 & 3 \end{bmatrix} = \begin{bmatrix} 3b-6 & 3c \\ -12 & 18 \end{bmatrix}$

$12a - 3 = 18$

$12a = 18 + 3$

$12a = 21$

$a = \frac{21}{12}$

$4a + 4 - 2b = 3b - 6$

$4\left(\frac{21}{12}\right) + 4 - 2b = 3b - 6$

$\frac{84}{12} + 4 - 2b - 3b = -6$

$-2b - 3b = -6 - 4 - \frac{84}{12}$

$-5b = -10 - \frac{84}{12}$

$5b = \frac{120}{12} + \frac{84}{12}$

$5b = 17$

$b = \frac{17}{5}$

$4b - c - 2 = -12$

$4\left(\frac{17}{5}\right) - c - 2 = -12$

$\frac{68}{5} - c - 2 = -12$

$-c = -12 - \frac{68}{5} + 2$

$c = 12 + \frac{68}{5} - 2$

$c = \frac{118}{5}$

$4c - 4d - 1 = 3c$

$4\left(\frac{118}{5}\right) - 4d - 1 = 3\left(\frac{118}{5}\right)$

$\frac{472}{5} - 4d - 1 = \frac{354}{5}$

$-4d = \frac{354}{5} - \frac{472}{5} + 1$

$4d = \frac{472}{5} - \frac{354}{5} - 1$

$4d = \frac{113}{5}$

$d = \frac{113}{5} \div 4$

$d = \frac{113}{5} \times \frac{1}{4}$

$d = \frac{113}{20}$

NOMOR III

1. diketahui $X = \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix}$, jika $X^2 = X.X$ dan $X^3 = X.X.X$ maka tentukan:

a. X^2

$$X^2 = \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix}\begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} -3(-3)+(-1(2)) & -3(-1)+(-1(4)) \\ 2(-3)+4(2) & 2(-1)+4(4) \end{bmatrix}$$

$$= \begin{bmatrix} 9-2 & 3-4 \\ -6+8 & -2+16 \end{bmatrix}$$

$$= \begin{bmatrix} 7 & -1 \\ -2 & 14 \end{bmatrix}$$

b. X^3

$$X^3 = \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix}\begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix}\begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix}$$

$$= \begin{bmatrix} 7 & -1 \\ -2 & 14 \end{bmatrix}\begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 7(-3)+(-1(2)) & 7(-1)+(-1(4)) \\ -2(-3)+14(2) & -2(-1)+14(4) \end{bmatrix}$$

$$= \begin{bmatrix} -21-2 & -7-4 \\ 6+28 & 2+56 \end{bmatrix}$$

$$= \begin{bmatrix} -23 & -11 \\ 34 & 58 \end{bmatrix}$$

2. jika $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 4 & 2 \end{bmatrix}$ dan $B = \begin{bmatrix} 4 & 2 \\ -1 & 1 \\ 0 & 0 \end{bmatrix}$ maka tentukan

a. $(BA)^T$

$$BA = \begin{bmatrix} 4 & 2 \\ -1 & 1 \\ 0 & 0 \end{bmatrix}\begin{bmatrix} 1 & 2 & 0 \\ 3 & 4 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} 4(1)+2(3) & 4(2)+2(4) & 4(0)+2(2) \\ -1(1)+1(3) & -1(2)+1(4) & -1(0)+1(2) \\ 0(1)+0(3) & 0(2)+0(4) & 0(0)+0(2) \end{bmatrix}$$

$$= \begin{bmatrix} 4+6 & 8+8 & 0+4 \\ -1+3 & -2+4 & 0+2 \\ 0+0 & 0+0 & 0+0 \end{bmatrix}$$

$$= \begin{bmatrix} 10 & 16 & 4 \\ 2 & 2 & 2 \\ 0 & 0 & 0 \end{bmatrix}$$

$$(BA)^T = \begin{bmatrix} 10 & 2 & 0 \\ 16 & 2 & 0 \\ 4 & 2 & 0 \end{bmatrix}$$

b. $(AB)^T$

$$AB = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 4 & 2 \end{bmatrix} \begin{bmatrix} 4 & 2 \\ -1 & 1 \\ 0 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 1(4)+2(-1)+0(0) & 1(2)+2(1)+0(0) \\ 3(4)+4(-1)+2(0) & 3(2)+4(1)+2(0) \end{bmatrix}$$

$$= \begin{bmatrix} 4-2+0 & 2+2+0 \\ 12-4+0 & 6+4+0 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 4 \\ 8 & 10 \end{bmatrix}$$

$$(AB)^T = \begin{bmatrix} 2 & 8 \\ 4 & 10 \end{bmatrix}$$

NOMOR IV

1. tentukan inversnya!(jika ada)

a. $A = \begin{bmatrix} -1 & 1 \\ 5 & 3 \end{bmatrix}$

$$A^{-1} = \frac{1}{-1(3)-1(5)} \begin{bmatrix} 3 & -1 \\ -5 & -1 \end{bmatrix}$$

$$= -\frac{1}{8} \begin{bmatrix} 3 & -1 \\ -5 & -1 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{3}{-8} & -\frac{1}{-8} \\ -\frac{5}{-8} & -\frac{1}{-8} \end{bmatrix}$$

$$= \begin{bmatrix} -\frac{3}{8} & \frac{1}{8} \\ \frac{5}{8} & \frac{1}{8} \end{bmatrix}$$

b. $B = \begin{bmatrix} 5 & -1 \\ -4 & 0 \end{bmatrix}$

$$B^{-1} = \frac{1}{5(0)-(-1(-4)} \begin{bmatrix} 0 & 1 \\ 4 & 5 \end{bmatrix}$$

$$= -\frac{1}{4} \begin{bmatrix} 0 & 1 \\ 4 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & -\frac{1}{4} \\ -1 & -\frac{5}{4} \end{bmatrix}$$

c. $C = \begin{bmatrix} 4 & 8 \\ -3 & -6 \end{bmatrix}$

$C^{-1} = \frac{1}{4(-6)-8(-3)}\begin{bmatrix} -6 & -8 \\ 3 & 4 \end{bmatrix}$

$= \frac{1}{-24+24}\begin{bmatrix} -6 & -8 \\ 3 & 4 \end{bmatrix}$

$= \frac{1}{0}\begin{bmatrix} -6 & -8 \\ 3 & 4 \end{bmatrix}$

$C^{-1} = \infty$

d. $D = \begin{bmatrix} 10 & -6 \\ 8 & -5 \end{bmatrix}$

$D^{-1} = \frac{1}{10(-5)-(-6(8))}\begin{bmatrix} -5 & 6 \\ -8 & 10 \end{bmatrix}$

$= \frac{1}{-50+48}\begin{bmatrix} -5 & 6 \\ -8 & 10 \end{bmatrix}$

$= -\frac{1}{2}\begin{bmatrix} -5 & 6 \\ -8 & 10 \end{bmatrix}$

$= \begin{bmatrix} \frac{5}{2} & 3 \\ 4 & -5 \end{bmatrix}$

2. tentukan matriks X jika:

a. $X\begin{bmatrix} 4 & 5 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 8 & 5 \\ 14 & 15 \end{bmatrix}$

invers, $\frac{1}{4(0)-5(2)}\begin{bmatrix} 0 & -5 \\ -2 & 4 \end{bmatrix} = -\frac{1}{10}\begin{bmatrix} 0 & -5 \\ -2 & 4 \end{bmatrix}$

$= \begin{bmatrix} 0 & \frac{1}{2} \\ \frac{1}{5} & -\frac{2}{5} \end{bmatrix}$

$X = \begin{bmatrix} 8 & 5 \\ 14 & 15 \end{bmatrix}\begin{bmatrix} 0 & \frac{1}{2} \\ \frac{1}{5} & -\frac{2}{5} \end{bmatrix}$

$= \begin{bmatrix} 8(0)+5\left(\frac{1}{5}\right) & 8\left(\frac{1}{2}\right)+5\left(-\frac{2}{5}\right) \\ 14(0)+15\left(\frac{1}{5}\right) & 14\left(\frac{1}{2}\right)+15\left(-\frac{2}{5}\right) \end{bmatrix}$

$= \begin{bmatrix} 0+1 & 4-2 \\ 0+3 & 7-6 \end{bmatrix}$

$= \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$

b. $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}X = \begin{bmatrix} 4 & 3 \\ 2 & -1 \end{bmatrix}$

invers, $\frac{1}{1(4)-2(3)}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} = -\frac{1}{2}\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

$$= \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$$

$$X = \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix} \begin{bmatrix} 4 & 3 \\ 2 & -1 \end{bmatrix}$$

$$X = \begin{bmatrix} -2(4)+1(2) & -2(3)+1(-1) \\ \frac{3}{2}(4)+\left(-\frac{1}{2}(2)\right) & \frac{3}{2}(3)+\left(-\frac{1}{2}(-1)\right) \end{bmatrix}$$

$$X = \begin{bmatrix} -8+2 & -6-1 \\ 6-1 & \frac{9}{2}+\frac{1}{2} \end{bmatrix}$$

$$X = \begin{bmatrix} -6 & -7 \\ 5 & 5 \end{bmatrix}$$

c. $\begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} X = \begin{bmatrix} 28 \\ -14 \end{bmatrix}$

invers, $\frac{1}{3(4)-(-2(1))} \begin{bmatrix} 4 & 2 \\ -1 & 3 \end{bmatrix} = \frac{1}{14} \begin{bmatrix} 4 & 2 \\ -1 & 3 \end{bmatrix}$

$$= \begin{bmatrix} \frac{2}{7} & \frac{1}{7} \\ -\frac{1}{14} & \frac{3}{14} \end{bmatrix}$$

$$X = \begin{bmatrix} \frac{2}{7} & \frac{1}{7} \\ -\frac{1}{14} & \frac{3}{14} \end{bmatrix} \begin{bmatrix} 28 \\ -14 \end{bmatrix}$$

$$X = \begin{bmatrix} \frac{2}{7}(28)+\frac{1}{7}(-14) \\ -\frac{1}{14}(28)+\frac{3}{14}(-14) \end{bmatrix}$$

$$X = \begin{bmatrix} 8-2 \\ -2-3 \end{bmatrix}$$

$$X = \begin{bmatrix} 6 \\ -5 \end{bmatrix}$$

d. $X \begin{bmatrix} 2 & -1 \\ 4 & 1 \end{bmatrix} = \begin{bmatrix} 8 & 2 \\ 14 & 5 \\ 10 & -2 \end{bmatrix}$

invers, $\frac{1}{2(1)-(-1(4))} \begin{bmatrix} 1 & 1 \\ -4 & 2 \end{bmatrix} = \frac{1}{6} \begin{bmatrix} 1 & 1 \\ -4 & 2 \end{bmatrix}$

$$= \begin{bmatrix} \frac{1}{6} & \frac{1}{6} \\ -\frac{2}{3} & \frac{1}{3} \end{bmatrix}$$

$$X = \begin{bmatrix} 8 & 2 \\ 14 & 5 \\ 10 & -2 \end{bmatrix} \begin{bmatrix} \frac{1}{6} & \frac{1}{6} \\ -\frac{2}{3} & \frac{1}{3} \end{bmatrix}$$

$$X = \begin{bmatrix} 8\left(\frac{1}{6}\right)+2\left(-\frac{2}{3}\right) & 8\left(\frac{1}{6}\right)+2\left(\frac{1}{3}\right) \\ 14\left(\frac{1}{6}\right)+5\left(-\frac{2}{3}\right) & 14\left(\frac{1}{6}\right)+5\left(\frac{1}{3}\right) \\ 10\left(\frac{1}{6}\right)+\left(-2\left(-\frac{2}{3}\right)\right) & 10\left(\frac{1}{6}\right)+\left(-2\left(\frac{1}{3}\right)\right) \end{bmatrix}$$

$$X = \begin{bmatrix} \frac{4}{3}-\frac{4}{3} & \frac{4}{3}+\frac{2}{3} \\ \frac{7}{3}-\frac{10}{3} & \frac{7}{3}+\frac{5}{3} \\ \frac{5}{3}+\frac{4}{3} & \frac{5}{3}-\frac{2}{3} \end{bmatrix}$$

$$X = \begin{bmatrix} 0 & 2 \\ -1 & 4 \\ 3 & 1 \end{bmatrix}$$