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KELAS : IF2A

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

$$a + c = 1$$

$$a = 1 - c$$

$$2a - c = 5$$

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

$$2 - 2c - c = 5$$

$$2 - 3c = 5$$

$$-3c = 5 - 2$$

$$-3c = 3$$

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

$$c = -1$$

$$a + c = 1$$

$$a - 1 = 1$$

$$a = 1 + 1$$

$$a = 2$$

$$3b + 4d = 15$$

$$3b = 15 - 4d$$

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

$$-b + 3d = 8$$

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

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

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

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

$$\frac{9d}{3} = 13$$

$$9d = 13 \times 3$$

$$9d = 39$$

$$d = \frac{39}{9}$$

$$3b + 4d = 15$$

$$3b + 4\left(\frac{39}{9}\right) = 15$$

$$3b + \frac{52}{3} = 15$$

$$3b = 15 - \frac{52}{3}$$

$$b = \frac{\frac{45}{3} - \frac{52}{3}}{3}$$

$$b = \frac{-7}{3}$$

$$b = -\frac{7}{9}$$

2. tentukan transpose dari:

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

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

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

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

NOMOR II

1. tentukan matrix x

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2. tentukan a, b, c dan d:

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

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

$$2a - 3 = 5$$

$$2a = 5 + 3$$

$$2a = 8$$

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

$$a = 4$$

$$4 + 3b = 7$$

$$3b = 7 - 4$$

$$3b = 3$$

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

$$b = 1$$

$$2 + 3c = 4$$

$$3c = 4 - 2$$

$$3c = 2$$

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

$$2d - 9 = -5$$

$$2d = -5 + 9$$

$$2d = 4$$

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

$$d = 2$$

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

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

$$12a - 3 = 18$$

$$12a = 18 + 3$$

$$12a = 21$$

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

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

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

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

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

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

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

$$5b = 17$$

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

$$4b - c - 2 = -12$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\begin{aligned} X^2 &= \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} -3(-3)+(-1)(2) & -3(-1)+(-1)(4) \\ 2(-3)+4(2) & 2(-1)+4(4) \end{bmatrix} \\ &= \begin{bmatrix} 9-2 & 3-4 \\ -6+8 & -2+16 \end{bmatrix} \\ &= \begin{bmatrix} 7 & -1 \\ -2 & 14 \end{bmatrix} \end{aligned}$$

b. X^3

$$\begin{aligned} X^3 &= \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} \\ &= \begin{bmatrix} 7 & -1 \\ -2 & 14 \end{bmatrix} \begin{bmatrix} -3 & -1 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 7(-3)+(-1)(2) & 7(-1)+(-1)(4) \\ -2(-3)+14(2) & -2(-1)+14(4) \end{bmatrix} \\ &= \begin{bmatrix} -21-2 & -7-4 \\ 6+28 & 2+56 \end{bmatrix} \\ &= \begin{bmatrix} -23 & -11 \\ 34 & 58 \end{bmatrix} \end{aligned}$$

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. $(BA)^T$

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

$$\begin{aligned}
 &= \begin{bmatrix} 4+6 & 8+8 & 0+4 \\ -1+3 & -2+4 & 0+2 \\ 0+0 & 0+0 & 0+0 \end{bmatrix} \\
 &= \begin{bmatrix} 10 & 16 & 4 \\ 2 & 2 & 2 \\ 0 & 0 & 0 \end{bmatrix} \\
 (BA)^T &= \begin{bmatrix} 10 & 2 & 0 \\ 16 & 2 & 0 \\ 4 & 2 & 0 \end{bmatrix}
 \end{aligned}$$

b. $(AB)^T$

$$\begin{aligned}
 AB &= \begin{bmatrix} 1 & 2 & 0 \\ 3 & 4 & 2 \end{bmatrix} \begin{bmatrix} 4 & 2 \\ -1 & 1 \\ 0 & 0 \end{bmatrix} \\
 &= \begin{bmatrix} 1(4)+2(-1)+0(0) & 1(2)+2(1)+0(0) \\ 3(4)+4(-1)+2(0) & 3(2)+4(1)+2(0) \end{bmatrix} \\
 &= \begin{bmatrix} 4-2+0 & 2+2+0 \\ 12-4+0 & 6+4+0 \end{bmatrix} \\
 &= \begin{bmatrix} 2 & 4 \\ 8 & 10 \end{bmatrix} \\
 (AB)^T &= \begin{bmatrix} 2 & 8 \\ 4 & 10 \end{bmatrix}
 \end{aligned}$$

NOMOR IV

1. tentukan inversnya!(jika ada)

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

$$\begin{aligned}
 A^{-1} &= \frac{1}{-1(3)-1(5)} \begin{bmatrix} 3 & -1 \\ -5 & -1 \end{bmatrix} \\
 &= -\frac{1}{8} \begin{bmatrix} 3 & -1 \\ -5 & -1 \end{bmatrix} \\
 &= \begin{bmatrix} \frac{3}{8} & \frac{1}{8} \\ \frac{5}{8} & \frac{1}{8} \end{bmatrix} \\
 &= \begin{bmatrix} \frac{3}{8} & \frac{1}{8} \\ \frac{5}{8} & \frac{1}{8} \end{bmatrix}
 \end{aligned}$$

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

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

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

$$\begin{aligned} C^{-1} &= \frac{1}{4(-6)-8(-3)} \begin{bmatrix} -6 & -8 \\ 3 & 4 \end{bmatrix} \\ &= \frac{1}{-24+24} \begin{bmatrix} -6 & -8 \\ 3 & 4 \end{bmatrix} \\ &= \frac{1}{0} \begin{bmatrix} -6 & -8 \\ 3 & 4 \end{bmatrix} \\ C^{-1} &= \infty \end{aligned}$$

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

$$\begin{aligned} D^{-1} &= \frac{1}{10(-5)-(-6(8))} \begin{bmatrix} -5 & 6 \\ -8 & 10 \end{bmatrix} \\ &= \frac{1}{-50+48} \begin{bmatrix} -5 & 6 \\ -8 & 10 \end{bmatrix} \\ &= -\frac{1}{2} \begin{bmatrix} -5 & 6 \\ -8 & 10 \end{bmatrix} \\ &= \begin{bmatrix} \frac{5}{2} & 3 \\ 4 & -5 \end{bmatrix} \end{aligned}$$

2. tentukan matriks X jika:

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

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

$$\begin{aligned} X &= \begin{bmatrix} 8 & 5 \\ 14 & 15 \end{bmatrix} \begin{bmatrix} 0 & \frac{1}{2} \\ \frac{1}{5} & -\frac{2}{5} \end{bmatrix} \\ &= \begin{bmatrix} 8(0)+5\left(\frac{1}{5}\right) & 8\left(\frac{1}{2}\right)+5\left(-\frac{2}{5}\right) \\ 14(0)+15\left(\frac{1}{5}\right) & 14\left(\frac{1}{2}\right)+15\left(-\frac{2}{5}\right) \end{bmatrix} \\ &= \begin{bmatrix} 0+1 & 4-2 \\ 0+3 & 7-6 \end{bmatrix} \\ &= \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix} \end{aligned}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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