LKPD-04
MATRIKS

A. Simak video berikut

B. Perhatikan kembali matriks-matriks berikut. (Matriks yang tersaji di LKPD 03)

$A = \begin{pmatrix} 2 & 1 \\ 5 & 3 \end{pmatrix}$	$B = \begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix}$	$C = \begin{pmatrix} 2 & -1 \\ 0 & 6 \end{pmatrix}$	$D = \begin{pmatrix} \frac{6}{12} & \frac{1}{12} \\ 0 & \frac{2}{12} \end{pmatrix}$
$E = \begin{pmatrix} -1 & 0 & 3 \\ 2 & -1 & 1 \\ 5 & 1 & -2 \end{pmatrix}$	$F = \begin{pmatrix} \frac{1}{20} & \frac{3}{20} & \frac{3}{20} \\ \frac{9}{20} & -\frac{13}{20} & \frac{7}{20} \\ \frac{7}{20} & \frac{1}{20} & \frac{1}{20} \end{pmatrix}$	$G = \begin{pmatrix} 0 & 4 & 1 \\ 3 & 5 & -2 \\ 0 & 3 & 6 \end{pmatrix}$	$H = \begin{pmatrix} -\frac{36}{63} & \frac{21}{63} & \frac{13}{63} \\ \frac{18}{63} & 0 & -\frac{3}{63} \\ -\frac{9}{63} & 0 & \frac{12}{63} \end{pmatrix}$

LIVEWORKSHEETS

Ingat:
***I* adalah matriks identitas**

$I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

$I_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$

1. **Matriks hasil *A* x *B* adalah ….**

   A* x *B

   $= \begin{pmatrix} 2 & 1 \\ 5 & 3 \end{pmatrix}\begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix}$

   $= \begin{pmatrix} 2.3 + 1.(-5) & 2.(-1) + 1.2 \\ 5.3 + 3.(-5) & 5.(-1) + 3.2 \end{pmatrix}$

   $= \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$

2. **Matriks hasil *C* x *D* adalah ….**

   C* x *D

   $= \begin{pmatrix} 2 & -1 \\ 0 & 6 \end{pmatrix}\begin{pmatrix} \frac{6}{12} & \frac{1}{12} \\ 0 & \frac{2}{12} \end{pmatrix}$

   $= \begin{pmatrix} 2 & -1 \\ 0 & 6 \end{pmatrix}.\frac{1}{12}\begin{pmatrix} 6 & 1 \\ 0 & 2 \end{pmatrix}$

   $= \frac{1}{12}\begin{pmatrix} 2 & -1 \\ 0 & 6 \end{pmatrix}\begin{pmatrix} 6 & 1 \\ 0 & 2 \end{pmatrix}$

   $= \frac{1}{12}\begin{pmatrix} 2.6 + (-1).0 & 2.1 + (-1).2 \\ 0.6 + 6.0 & 0.6 + 6.2 \end{pmatrix}$

   $= \frac{1}{12}\begin{pmatrix} 12 & 0 \\ 0 & 12 \end{pmatrix}$

   $= \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$

3. **Matriks hasil *E* x *F* adalah ….**

   E* x *F

   $= \begin{pmatrix} -1 & 0 & 3 \\ 2 & -1 & 1 \\ 5 & 1 & -2 \end{pmatrix}\begin{pmatrix} \frac{1}{20} & \frac{3}{20} & \frac{3}{20} \\ \frac{9}{20} & -\frac{13}{20} & \frac{7}{20} \\ \frac{7}{20} & \frac{1}{20} & \frac{1}{20} \end{pmatrix}$

   $= \begin{pmatrix} -1 & 0 & 3 \\ 2 & -1 & 1 \\ 5 & 1 & -2 \end{pmatrix}.\frac{1}{20}\begin{pmatrix} 1 & 3 & 3 \\ 9 & -13 & 7 \\ 7 & 1 & 1 \end{pmatrix}$

   $= \frac{1}{20}\begin{pmatrix} -1 & 0 & 3 \\ 2 & -1 & 1 \\ 5 & 1 & -2 \end{pmatrix}\begin{pmatrix} 1 & 3 & 3 \\ 9 & -13 & 7 \\ 7 & 1 & 1 \end{pmatrix}$

   $= \frac{1}{20}\begin{pmatrix} -1.1 + 0.9 + 3.7 & -1.3 + 0.(-13) + 3.1 & -1.3 + 0.7 + 3.1 \\ 2.1 + (-1).9 + 1.7 & 2.3 + (-1)(-13) + 1.1 & 2.3 + (-1).7 + 1.1 \\ 5.1 + 1.9 + (-2).7 & 5.3 + 1.(-13) + (-2).1 & 5.3 + 1.7 + (-2).1 \end{pmatrix}$

   $= \frac{1}{20}\begin{pmatrix} 20 & 0 & 0 \\ 0 & 20 & 0 \\ 0 & 0 & 20 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I$

LIVEWORKSHEETS

4. Matriks hasil G x H adalah ….

G x H

$$= \begin{pmatrix} 0 & 4 & 1 \\ 3 & 5 & -2 \\ 0 & 3 & 6 \end{pmatrix} \begin{pmatrix} -\frac{36}{63} & \frac{21}{63} & \frac{13}{63} \\ \frac{18}{63} & 0 & -\frac{3}{63} \\ -\frac{9}{63} & 0 & \frac{12}{63} \end{pmatrix}$$

$$= \begin{pmatrix} 0 & 4 & 1 \\ 3 & 5 & -2 \\ 0 & 3 & 6 \end{pmatrix} \cdot \frac{1}{36} \begin{pmatrix} -36 & 21 & 13 \\ 18 & 0 & -3 \\ -9 & 0 & 12 \end{pmatrix}$$

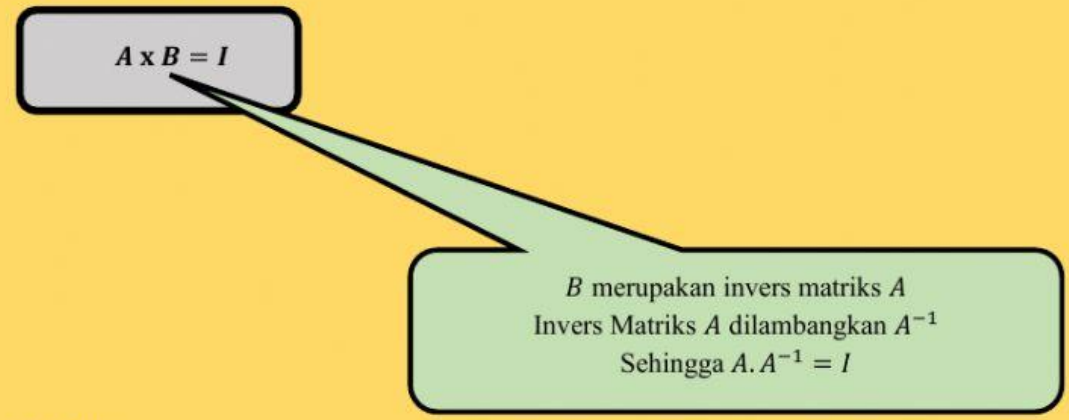
$$= \frac{1}{36} \begin{pmatrix} 0 & 4 & 1 \\ 3 & 5 & -2 \\ 0 & 3 & 6 \end{pmatrix} \begin{pmatrix} -36 & 21 & 13 \\ 18 & 0 & -3 \\ -9 & 0 & 12 \end{pmatrix}$$

$$= \frac{1}{36} \begin{pmatrix} 0.(-36) + 4.18 + 1.(-9) & 0.21 + 4.0 + 1.0 & 0.13 + 4.(-3) + 1.12 \\ 3.(-36) + 5.18 + (-2)(-9) & 3.21 + 5.0 + (-2).0 & 3.13 + 5(-3) + (-2).12 \\ 0.(-36) + 3.18 + 6.(-9) & 0.21 + 3.0 + 6.0 & 0.13 + 3.(-3) + 6.12 \end{pmatrix}$$

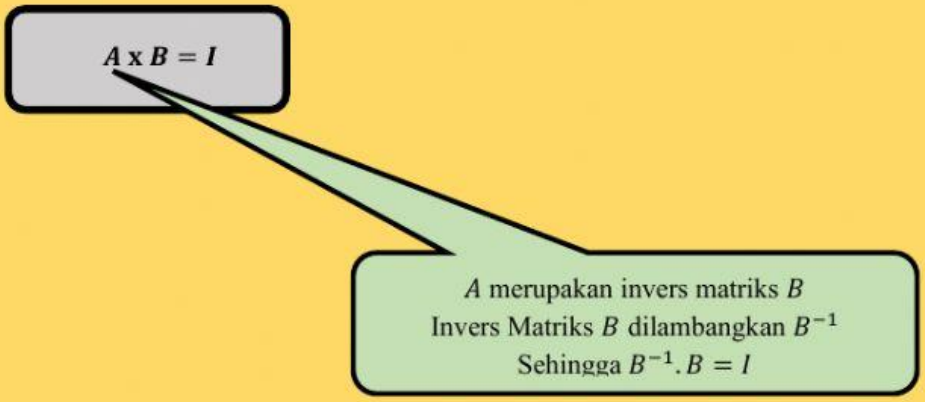
$$= \frac{1}{36} \begin{pmatrix} 63 & 0 & 0 \\ 0 & 63 & 0 \\ 0 & 0 & 63 \end{pmatrix}$$

$$= \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I$$

C. Kesimpulan 01



Sebaliknya



LIVEWORKSHEETS

D. Kesimpulan 02

1) $\boldsymbol{A \times B} = \begin{pmatrix} 2 & 1 \\ 5 & 3 \end{pmatrix}\begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$, maka $A^{-1} = \begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix}$

2) $\boldsymbol{C \times D} = \begin{pmatrix} 2 & -1 \\ 0 & 6 \end{pmatrix}\begin{pmatrix} \frac{6}{12} & \frac{1}{12} \\ 0 & \frac{2}{12} \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$, maka $C^{-1} = \begin{pmatrix} \frac{6}{12} & \frac{1}{12} \\ 0 & \frac{2}{12} \end{pmatrix} = \frac{1}{12}\begin{pmatrix} 6 & 1 \\ 0 & 2 \end{pmatrix}$

3) $\boldsymbol{E \times F} = \begin{pmatrix} -1 & 0 & 3 \\ 2 & -1 & 1 \\ 5 & 1 & -2 \end{pmatrix}\begin{pmatrix} \frac{1}{20} & \frac{3}{20} & \frac{3}{20} \\ \frac{9}{20} & -\frac{13}{20} & \frac{7}{20} \\ \frac{7}{20} & \frac{1}{20} & \frac{1}{20} \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I$

Maka $E^{-1} = \begin{pmatrix} \frac{1}{20} & \frac{3}{20} & \frac{3}{20} \\ \frac{9}{20} & -\frac{13}{20} & \frac{7}{20} \\ \frac{7}{20} & \frac{1}{20} & \frac{1}{20} \end{pmatrix} = \frac{1}{20}\begin{pmatrix} 1 & 3 & 3 \\ 9 & -13 & 7 \\ 7 & 1 & 1 \end{pmatrix}$

4) $\boldsymbol{G \times H} = \begin{pmatrix} 0 & 4 & 1 \\ 3 & 5 & -2 \\ 0 & 3 & 6 \end{pmatrix}\begin{pmatrix} -\frac{36}{63} & \frac{21}{63} & \frac{13}{63} \\ \frac{18}{63} & 0 & -\frac{3}{63} \\ -\frac{9}{63} & 0 & \frac{12}{63} \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = I$

Maka $G^{-1} = \begin{pmatrix} -\frac{36}{63} & \frac{21}{63} & \frac{13}{63} \\ \frac{18}{63} & 0 & -\frac{3}{63} \\ -\frac{9}{63} & 0 & \frac{12}{63} \end{pmatrix} = \frac{1}{36}\begin{pmatrix} -36 & 21 & 13 \\ 18 & 0 & -3 \\ -9 & 0 & 12 \end{pmatrix}$

Bagaimana mencari invers suatu matriks?

1. **Determinan Matriks**
2. **Invers Matriks**

LIVEWORKSHEETS

Determinan Matriks

E. Memahami determinan matriks

- **Determinan matriks berordo 2x2**

  Determinan matriks A ditulis $\det A$ atau $|A|$

  $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$, maka $\det A = |A| = ad - bc$

  Contoh:

  1) Determinan matriks $P = \begin{pmatrix} 3 & -1 \\ 2 & 3 \end{pmatrix}$ adalah $|P| = 3.3 - 2.(-1) = 9 + 2 = 11$

  2) Determinan matriks $H = \begin{pmatrix} 2 & 1 \\ 4 & 2 \end{pmatrix}$ adalah $|H| = 2.2 - 4.1 = 4 - 4 = 0$

- **Determinan matriks berordo 3x3**

  Determinan matriks A ditulis $\det A$ atau $|A|$

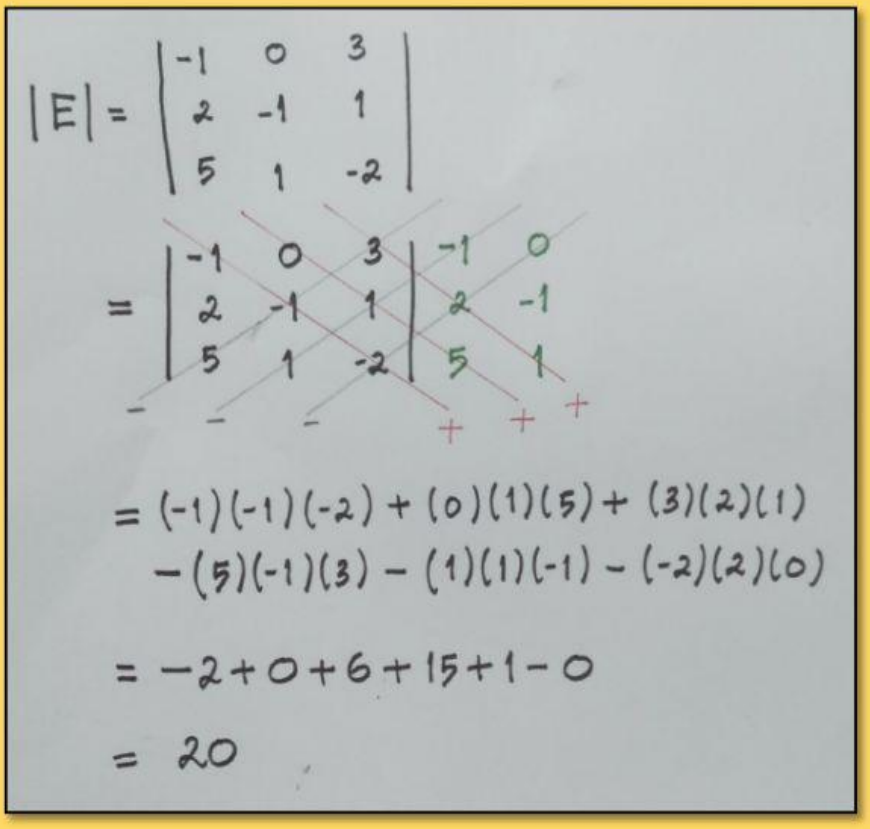
Menentukan determinan matriks berordo 3x3
- 1. Cara Sarrus
- 2. Cara Ekspansi Kofaktor

LIVEWORKSHEETS

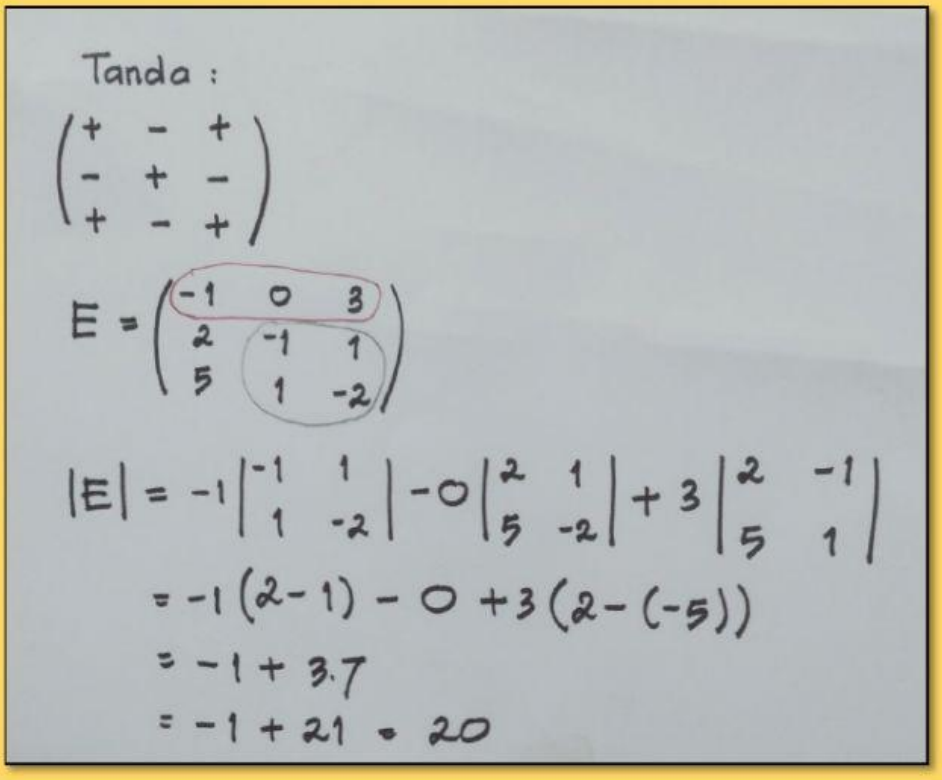
Contoh:

Menentukan invers matriks $E = \begin{pmatrix} -1 & 0 & 3 \\ 2 & -1 & 1 \\ 5 & 1 & -2 \end{pmatrix}$

Cara 1: Cara Sarrus



Cara 2: Cara Ekspansi Kofaktor



LIVEWORKSHEETS

F. Latihan Soal (Pilih jawaban dengan memilih di dalam kotak)

1. Determinan matriks $A = \begin{pmatrix} 2 & 5 \\ -2 & 3 \end{pmatrix}$ adalah
2. Determinan matriks $P = \frac{1}{2}\begin{pmatrix} 16 & -4 \\ 2 & 2 \end{pmatrix}$ adalah
3. Determinan matriks $Q = \begin{pmatrix} -3 & 1 \\ x & 2 \end{pmatrix}$ adalah 4, maka nilai x adalah
4. Determinan matriks $H = \begin{pmatrix} 1 & 2 & -1 \\ 0 & 3 & 4 \\ 1 & -1 & 2 \end{pmatrix}$ adalah
5. Determinan matriks $U = \begin{pmatrix} -1 & 0 & 0 \\ 12 & 1 & 1 \\ 0 & 2 & 4 \end{pmatrix}$ adalah
6. Determinan matriks $T = \begin{pmatrix} 4 & 1 & 0 \\ 2 & 0 & -1 \\ 2 & 1 & 1 \end{pmatrix}$ adalah

----Selamat Belajar, setelah ini lanjut LKPD 05----

LIVEWORKSHEETS