DETERMINAN

$$\det A = |A|$$

a

b c

$$P_3 = 3!$$
$$= 3 \cdot 2 \cdot 1$$
$$= 6$$

$$\boxed{P_n = n!}$$

a b c
a c b

---

b a c
b c a

---

c a b
c b a

$1\ 2\ 3 \longrightarrow$ INVERSINYA $= 0 + 0 + 0 = 0$

$1\ 3\ 2 \longrightarrow$ $= 0 + 0 + 1 = 1$

$2\ 1\ 3 \longrightarrow$ $= 1 + 0 + 0 = 1$

$2\ 3\ 1 \longrightarrow$ $= 0 + 1 + 1 = 2$

$3\ 1\ 2 \longrightarrow$ $= 1 + 1 + 0 = 2$

$3\ 2\ 1 \longrightarrow$ $= 1 + 1 + 1 = 3$

VARIASI

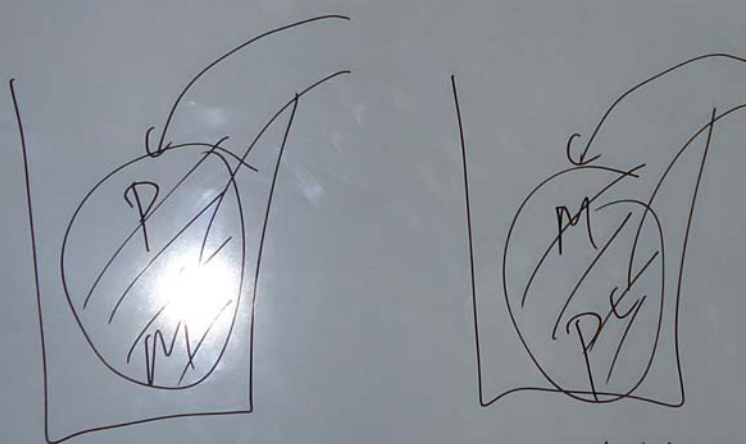
MP → RI

PM → POLANDIA

$$V(n,r) = \frac{n!}{(n-r)!}$$

KOMBINASI

$$C(n,r) = \frac{n!}{r!\,(n-r)!}$$



PINK PINK

$-\infty, \ldots, -3, -2, -1, 0, 1, 2, 3, \ldots, \infty$

SISTEM BILANGAN

- BIL. KOMPLEKS : $z = a + ib$
  - BIL. REAL (RIIL)
    - BIL. RASIONAL
      - PECAHAN
      - BIL. BULAT
        - BULAT NEGATIF
        - CACAH
          - NOL
          - BULAT POSITIF
            - ASLI
              - GANJIL
              - GENAP
            - KOMPOSIT
    - BIL. IRASIONAL ($\sqrt{2}, \sqrt{3}, \pi, e, \ldots$)
  - BIL. IMAJINER ($i = \sqrt{-1}$)

SIFAT DETERMINAN

①
$$\begin{vmatrix} 1 & 2 & 3 & 4 \\ 0 & 0 & 0 & 0 \\ 5 & 9 & 7 & 8 \\ 4 & 2 & 1 & 3 \end{vmatrix} = 0$$

$$\begin{vmatrix} 1 & 5 & 0 & 4 \\ 2 & 7 & 0 & 3 \\ 3 & 6 & 0 & 1 \\ 4 & 5 & 0 & 2 \end{vmatrix} = 0$$

② Matriks △ atas / △ BAWAH

$$\begin{vmatrix} 2 & 1 & 3 \\ 0 & 4 & 1 \\ 0 & 0 & 1 \end{vmatrix} = (2)(4)(1) = 8$$

$$\begin{vmatrix} 2 & 0 & 0 \\ 1 & 3 & 0 \\ 4 & 1 & 2 \end{vmatrix} = (2)(3)(2) = 12$$

$$A_1 \xrightarrow{b_2(3)} A_2$$

$$|A_2| = 3 \cdot |A_1|$$

$$\begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix} \longrightarrow |A_1| = \begin{vmatrix} 4 & 3 \\ 2 & 5 \end{vmatrix} = 20 - 6 = 14$$

$$= \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix} \xrightarrow{b_2(3)} A_2 = \begin{bmatrix} 4 & 3 \\ 6 & 15 \end{bmatrix}$$

$$\begin{aligned} |A_2| &= (4)(15) - (3)(6) \\ &= 60 - 18 \\ &= 42 = 3 \times 14 \\ &= 3\,|A_1| \end{aligned}$$

④ $A_1 \xrightarrow{b_{ij}} A_2$

$$|A_2| = -|A_1|$$

$$A_1 = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix} \longrightarrow |A_1| = 20 - 6 = 14$$

$$A_1 = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix} \xrightarrow[b_{21}]{b_{12}} A_2 = \begin{bmatrix} 2 & 5 \\ 4 & 3 \end{bmatrix}$$

$$|A_2| = \begin{vmatrix} 2 & 5 \\ 4 & 3 \end{vmatrix} = 6 - 20$$

$$= -14$$

$$= -|A_1|$$

⑤ $A_1 \xrightarrow{b_{ij}(p)} A_2$

$$A_1 = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \rightarrow |A_1| = 4 - 6 = -2$$

$$A_1 = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \xrightarrow{b_{21}\left(\frac{1}{111}\right)} A_2 = \begin{bmatrix} 1 & 2 \\ \frac{334}{111} & \frac{446}{111} \end{bmatrix}$$

$$b_2 = b_2 + \left(\frac{1}{111}\right) b_1$$

$$\begin{array}{lll} b_2: & 3 & 4 \\ \frac{1}{111} b_1: & \frac{1}{111} & \frac{2}{111} \quad + \\ \hline b_2: & 3\frac{1}{111} & 4\frac{2}{111} \\ & \frac{334}{111} & \frac{446}{111} \end{array}$$

$$|A_2| = \frac{446}{111} - \frac{668}{111}$$

$$= -\frac{222}{111}$$

$$= -2$$

(6) $A = \begin{bmatrix} 7 & 2 \\ 8 & 3 \end{bmatrix} \longrightarrow |A| = 21 - 16 = 5$

$B = \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix} \longrightarrow |B| = 2 - 12 = -10$

$$A \cdot B = \begin{bmatrix} 7 & 2 \\ 8 & 3 \end{bmatrix} \begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 7+6 & 28+4 \\ 8+9 & 32+6 \end{bmatrix}$$

$$= \begin{bmatrix} 13 & 32 \\ 17 & 38 \end{bmatrix}$$

$$|A \cdot B| = (13)(38) - (32)(17)$$
$$= 494 - 544 = -50$$

$$|A \cdot B| = |A| \cdot |B| = (5)(-10) = -50$$

7 $|A^{-1}| = \dfrac{1}{|A|}$

$A = \begin{bmatrix} 7 & 3 \\ 6 & 4 \end{bmatrix} \longrightarrow |A| = 28 - 18 = 10$

$A^{-1} = \dfrac{1}{|A|} \cdot adj(A) = \dfrac{1}{10} \begin{bmatrix} 4 & -3 \\ -6 & 7 \end{bmatrix} = \begin{bmatrix} \frac{4}{10} & -\frac{3}{10} \\ -\frac{6}{10} & \frac{7}{10} \end{bmatrix}$

$|A^{-1}| = \dfrac{28}{100} - \dfrac{18}{100} = \dfrac{10}{100} = \dfrac{1}{10}$

$|A^{-1}| = \dfrac{1}{|A|} = \dfrac{1}{10}$

(8) $|A^t| = |A|$

$A = \begin{bmatrix} 2 & 1 \\ 5 & 7 \end{bmatrix} \longrightarrow A^t = \begin{bmatrix} 2 & 5 \\ 1 & 7 \end{bmatrix}$

$|A| = 14 - 5 = \boxed{9}$

$|A^t| = 14 - 5 = \boxed{9}$

$|A^t| = |A|$

9 $\left| p \cdot A_{n \times n} \right| = p^n \cdot \left| A_{n \times n} \right|$

$\underset{2\times 2}{A} = \begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix} \longrightarrow |A| = 8 - 3 = \boxed{5}$

$p = 3 \longrightarrow 3A = 3\begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix} = \begin{bmatrix} 12 & 3 \\ 9 & 6 \end{bmatrix}$

$|3A| = \begin{vmatrix} 12 & 3 \\ 9 & 6 \end{vmatrix} = 72 - 27 = \boxed{45}$

$= 9 \times 5$

$= 3^2 |A|$

MINOR & KOFAKTOR

$$A_{3\times3} = \begin{bmatrix} 1 & 2 & \cancel{3} \\ \cancel{4} & \cancel{5} & \cancel{6} \\ 7 & 8 & \cancel{7} \end{bmatrix}$$

$$\begin{array}{ccc} \cancel{1} & \cancel{2} & \cancel{3} \\ 4 & 5 & \cancel{6} \\ 7 & 8 & \cancel{7} \end{array}$$

$$M_{23} = \begin{vmatrix} 1 & 2 \\ 7 & 8 \end{vmatrix} = 8 - 14 = \boxed{-6}$$

$$K_{ij} = (-1)^{i+j} \cdot M_{ij}$$

$$K_{23} = (-1)^{2+3} \cdot M_{23}$$

$$= (-1) \cdot (-6)$$

$$= \boxed{6}$$

$$K_{13} = (-1)^{1+3} \begin{vmatrix} 4 & 5 \\ 7 & 8 \end{vmatrix}$$

$$= (+1)(32 - 35)$$

$$= -3$$

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 1 & 5 \\ 3 & 2 & 4 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 1 & 5 \\ 3 & 2 & 4 \end{vmatrix} \begin{matrix} b_{21}\left(\frac{-4}{1}\right) \rightarrow \\ b_{31}\left(\frac{-3}{1}\right) \rightarrow \end{matrix} \begin{vmatrix} 1 & 2 & 3 \\ 0 & -7 & -7 \\ 0 & -4 & -5 \end{vmatrix} \; b_{32}\left(\frac{+4}{-7}\right) \rightarrow \begin{vmatrix} 1 & 2 & 3 \\ 0 & -7 & -7 \\ 0 & 0 & -1 \end{vmatrix} = (1)(-7)(-1) = \boxed{7}$$

$b_2 = b_2 + (-4)b_1$

b_2:	4	1	5	
$-4b_1$:	-4	-8	-12	+
b_2:	0	-7	-7	

$b_3 = b_3 + (-3)b_1$

b_3:	3	2	4	
$-3b_1$:	-3	-6	-9	+
b_3:	0	-4	-5	

$b_3 = b_3 + \left(-\frac{4}{7}\right)b_2$

b_3:	0	-4	-5	
$-\frac{4}{7}b_2$:	0	4	4	+
b_3:	0	0	-1	

CARA KOFAKTOR

$$A_{3\times3} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$$

1) MATRIKS A DIEKSPANSI PADA BARIS-1

$$|A| = a_{11} \cdot K_{11} + a_{12} \cdot K_{12} + a_{13} \cdot K_{13}$$

2) MATRIKS A DIEKSPANSI PD BARIS-2

$$|A| = a_{21} \cdot K_{21} + a_{22} \cdot K_{22} + a_{23} \cdot K_{23}$$