Eksponen

- $a^m \times a^n = a^{m+n}$
- $\frac{a^m}{a^n} = a^{m-n}$
- $(a^m)^n = a^{m \times n}$
- $(a \times b)^n = a^n \times b^n$
- $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \quad (b \neq 0)$
- $a^0 = 1 \quad (a \neq 0)$
- $a^{-n} = \frac{1}{a^n} \quad (a \neq 0)$
- $\frac{1}{a^{-n}} = a^n \quad (a \neq 0)$
- $a^{mx+1} = a^{nx-1}$

  $mx+1 = nx-1$

Pertidak/Persamaan Eksponen

- $a^{f(x)} = 1$

  $f(x) = 0$
- $a^{f(x)} = a^p$

  $f(x) = p$
- $a^{f(x)} = a^{g(x)}$

  $f(x) = g(x)$
- $a^{f(x)} = b^{f(x)}$

  $f(x) = 0$
- $\{P(x)\}^{f(x)} = \{P(x)\}^{g(x)}$

  $f(x) = g(x)$

  $P(x) = 1$

  $P(x) = 0 \; ; f(x) > 0 \; ; g(x) > 0$

  $P(x) = -1 \; ; f(x)$ & $g(x) =$ yang ganjil/genap
- $f(x)^{h(x)} = g(x)^{h(x)}$

  $f(x) = g(x)$

  $h(x) = 0 \; , f(x) \neq 0 \; ; g(x) \neq 0$
- $A\{a^{f(x)}\}^2 + B\{a^{f(x)}\} + C = 0$

  $a^{f(x)} = m$

  $Am^2 + Bm + C = 0$
- $a > 1$
  - $a^{f(x)} \geq a^{g(x)}$

    $f(x) \geq g(x)$
  - $a^{f(x)} \leq a^{g(x)}$

    $f(x) \leq g(x)$
- $0 < a < 1$
  - $a^{f(x)} \geq a^{g(x)}$

    $f(x) \leq g(x)$
  - $a^{f(x)} \leq a^{g(x)}$

    $f(x) \geq g(x)$

Logaritma

- $^a\log m + {}^a\log n = {}^a\log mn$
- $^a\log m - {}^a\log n = {}^a\log \frac{m}{n}$
- $^a\log m^n = n \cdot {}^a\log m$
- $^{a^b}\log m^n = \frac{n}{b} \cdot {}^a\log m$
- $^a\log m = \frac{{}^b\log m}{{}^b\log a}$
- $^a\log m = \frac{1}{{}^m\log a}$
- $^a\log a = 1$
- $^a\log 1 = 0$
- $^a\log \frac{1}{a} = -1$
- $^a\log m \cdot {}^m\log b = {}^a\log b$
- $a^{{}^a\log m} = m$
- $^a\log \frac{m}{n} = -{}^a\log \frac{n}{m}$
- $^a\log a^m = m$
- $(a^m)^{a^{\log x}} = x^{\frac{m}{n}}$

Persamaan & Pertidaksamaan Logaritma

- $^a\log f(x) = {}^a\log p$

  $f(x) = p \; ; f(x) > 0$
- $^a\log f(x) = {}^a\log g(x)$

  $f(x) = g(x)$

  $f(x) > 0 \; ; g(x) > 0$
- $^a\log f(x) = {}^b\log f(x)$

  $f(x) = 1 \; ; f(x) > 0$
- $^{h(x)}\log f(x) = {}^{h(x)}\log g(x)$

  $h(x) > 0 \; ; h(x) \neq 1 \; ; f(x) = g(x)$

  $f(x) > 0 \; , g(x) > 0$
- $^{f(x)}\log a = {}^{g(x)}\log a$

  $f(x) = g(x)$

  $f(x) > 0 \; ; f(x) \neq 1 \; ; g(x) > 0 \; ; g(x) \neq 1$
- $^{f(x)}\log g(x) = p$

  $g(x) = \{f(x)\}^p$

  $f(x) > 0 \; ; f(x) \neq 1 \; ; g(x) > 0$
- $A\{^a\log x\}^2 + B\{^a\log x\} + C = 0$

  $^a\log x = m$

  $Am^2 + Bm + C = 0$

- $a > 1$

  $^a\log f(x) \geq {}^a\log g(x)$

  $f(x) \geq g(x)$, dan sebaliknya
- $0 < a < 1$

  $^a\log f(x) \geq {}^a\log g(x)$

  $f(x) \leq g(x)$, dan sebaliknya

Fungsi Kuadrat

$ax^2 + bx + c = 0 \; ; a \neq 0$

$D = b^2 - 4ac$

- $D > 0$, 2 akar real yg berbeda
- $D = 0$, akar kembar
- $D < 0$, tdk punya akar nyata/imajiner

$x_1, x_2 = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

- $x_1 + x_2 = -\frac{b}{a}$
- $x_1 \cdot x_2 = \frac{c}{a}$
- $x_1 - x_2 = \frac{\sqrt{D}}{a}$
- akar berlawanan ; $b = 0$
- akar berkebalikan ; $c = a$

→ menyusun persamaan kuadrat

$x^2 + \frac{b}{a}x + \frac{c}{a} = 0$

$x^2 - (x_1 + x_2)x + x_1 \cdot x_2 = 0$

→ menentukan fungsi kuadrat

(p, q) → titik balik

(x, y) → titik yg dilalui

$y = a(x-p)^2 + q$

→ sumbu simetris $= \frac{-b}{2a}$

→ titik balik $= \left(\frac{-b}{2a}, \frac{-D}{4a}\right)$

Pertidaksamaan Kuadrat

→ $3x - 9 < 0$

$3x < 9$

$x < 3$

→ $x^2 + x - 6 \leq 0$

$(x+3)(x-2) \leq 0$

+ | − | +

-3 2

$-3 \leq x \leq 2$

→ $\sqrt{x+6} > \sqrt{2x+4}$

- $x + 6 \geq 0$ $\quad 2x + 4 \geq 0$

$x \geq -6$ $\quad 2x \geq -4$

$x \geq -2$

dikuadratkan

- $x + 6 > 2x + 4$

$2 > x$

$x < 2$

Hp = {x | $-2 \leq x < 2$, $x \in$ Real}

→ $|x-5| < 1$

$-1 < x - 5 < 1$

$4 < x < 6$

→ $|x-2| \leq |x-1|$

$x^2 - 4x + 4 < x^2 - 2x + 1$

$0 < 2x - 3$

$3 < 2x$

$x > \frac{3}{2}$

→ $|-x| > |x-3|$

$x > x^2 - 6x + 9$

$0 > x^2 - 7x + 9$

→ $|x-1|^2 + 2|x-1| < 15$

$m^2 + 2m - 15 < 0$

$(m-3)(m+5) < 0$

+ | − | +

-5 3

$m < 3$ $\quad m > -5$

$|x-1| < 3$ $\quad |x-1| > -5$

$-3 < x - 1 < 3$ $\quad 5 > x - 1 > -5$

$-2 < x < 4$ $\quad 6 > x > -4$

$\frac{x-3}{x+2} > 0 \rightarrow (x-3)(x+2) > 0$

$\frac{(x-a)}{(x+b)} > 0 \rightarrow (x-a)(x+b) > 0$

$x = a$; $x = -b$

− | + | −

-b a

LOGIKA MTK

→ negasi / ingkaran (~)

P	~P
B	S
S	B

→ konjungsi / dan (∧)

P	Q	P∧Q
B	B	B
B	S	S
S	B	S
S	S	S

→ disjungsi / atau (∨)

P	Q	P∨Q
B	B	B
B	S	B
S	B	B
S	S	S

→ Implikasi / jika ... maka ... (→)

P (anteseden)	Q (konsekuen)	P→Q
B	B	B
B	S	S
S	B	B
S	S	B

Kondisional

→ Ekivalensi / ... jika & hanya jika (↔)

P	Q	P↔Q
B	B	B
B	S	S
S	B	S
S	S	B

bi implikasi

$(p \rightarrow q) \wedge (q \rightarrow p)$

Implikasi	invers	konvers	kontra posisi
P → Q	~P → ~Q	Q → P	~Q → ~P
B	B	B	B
S	B	B	S
B	S	S	B
B	B	B	B

→ Modus Ponens (sah) tautologi

P → Q

P

∴ Q

$\Rightarrow ((p \rightarrow Q) \wedge p) \rightarrow Q$

→ Modus Tollens (sah)

P → Q

~Q

∴ ~P

$\Rightarrow ((p \rightarrow Q) \wedge \sim Q) \rightarrow \sim p$

→ silogisme

P → R

R → Q

∴ P → Q

$\Rightarrow ((p \rightarrow R) \wedge (R \rightarrow Q)) \rightarrow (p \rightarrow Q)$

→ dalil morgan

$\sim(p \wedge q) = \sim p \vee \sim q$

$\sim(p \vee q) = \sim p \wedge \sim q$

$\sim(p \rightarrow q) = p \wedge \sim q$

$\sim(\sim(p \rightarrow q)) = p \rightarrow q = \sim(p \wedge \sim q)$

$= \sim p \vee q = \sim q \rightarrow \sim p$

$= \sim p \vee q$

Statistik

> Mean (rata)

$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$ $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$

$\bar{x} = x_0 + \frac{\sum fd}{\sum f}$

x_0 = titik tengah yg f-nya banyak

$d = x_i - x_0$

> Median

• Genap

$Me = x_{\frac{n}{2}} + x_{\frac{n}{2}+1}$

• Ganjil

$Me = x_{(\frac{n+1}{2})}$

$Me = Q_2$

> Modus

$Mo = L + \frac{d_1}{d_1 + d_2} \cdot i$

L = tepi bawah kls modus (-0,5)

> Kuartil

• Ganjil

$Q_1 = x_{1/4(n+1)}$

$Q_2 = x_{2/4(n+1)}$

$Q_3 = x_{3/4(n+1)}$

• Genap

$Q_1 = x_{1/4(n+2)}$

$Q_2 = x_{2/4(2n+2)}$

$Q_3 = x_{3/4(3n+2)}$

• menentukan kelas Q

$Q_j = LQ_j + \frac{\frac{j}{4}n - fkQ_j}{fQ_j} \cdot i$

• Rataan tiga kuartil

$R_t = \frac{1}{4}(Q_1 + 2Q_2 + Q_3)$

• Rataan Quartil

$R_k = \frac{1}{2}(Q_1 + Q_3)$

• Jangkauan antar kuartil

$H = Q_3 - Q_1$

• Jangkauan semiinterkuatil / simpangan kuartil

$Qd = \frac{1}{2}(Q_3 - Q_1) = \frac{1}{2}H$

• Rentang

$J = X_{max} - X_{min}$

• Simpangan rata²

$SR = \frac{\sum f(x_i - \bar{x})}{\sum f}$

• Ragam (Varians)

$S^2 = \frac{\sum (x_i - \bar{x})^2}{n}$; $S^2 = \frac{\sum f(x_i - \bar{x})^2}{\sum f}$

• simpangan Baku

• $S = \sqrt{S^2}$

• $S = \sqrt{\frac{\sum fd^2}{n} - \left(\frac{\sum fd}{n}\right)^2}$

• $S = \sqrt{\frac{\sum fx^2}{n} - \left(\frac{\sum fx}{n}\right)^2}$

Peluang

> $n! = \ldots(n-2) \times (n-1) \times n$

> ${}_nP_r = \frac{n!}{(n-r)!}$

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

$(a+b)^n = \sum_{r=0}^{n} {}_nC_r\, a^{n-r} b^r$

$U_r = {}_nC_{r-1}\, a^{n-(r-1)} b^{r-1}$

rumus koin 2^n > n(S)

rumus dadu 6^n

$P(A) = \frac{n(A)}{n(S)}$ n(A) = kejadian

$P(A') = 1 - P(A)$

> Kejadian saling lepas

$P(A \cup B) = P(A) + P(B)$

> kejadian saling bebas

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cap B) = \frac{n(A \cap B)}{n(S)} = P(A) \cdot P(B)$

$\frac{n(A \cap B)}{n(S)} \neq P(A) \cdot P(B)$ tdk saling bebas

> tanpa pengembalian

$P(A) = \frac{n(A)}{n(S_A)}$; $P(B) = \frac{n(B)}{n(S_B)}$

$P(A \cap B) = P(A) \cdot P(B/A)$

Lingkaran

Pusat (0,0) → $x^2 + y^2 = r^2$

pusat (a,b) → $(x-a)^2 + (y-b)^2 = r^2$

$x^2 + y^2 + Ax + By + C = 0$

$a = -\frac{1}{2}A$; $b = -\frac{1}{2}B$; $r = \sqrt{\frac{1}{4}A^2 + \frac{1}{4}B^2 - C}$

Garis menyinggung lingkaran

$d = r = \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}}$

pusat (x_1, y_1) pers grs $ax + by + c$

Garis singgung melalui titik

> $x_1 x + y_1 y = r^2$

> $(x_1 - a)(x - a) + (y_1 - b)(y - b) = r^2$

Garis singgung yang gradiennya diket

$y = mx \pm r\sqrt{1 + m^2}$

$y - b = m(x - a) \pm r\sqrt{1 + m^2}$

$y - y_1 = m(x - x_1)$

$x_1 x + y_1 y + \frac{1}{2}A(x + x_1) + \frac{1}{2}B(y + y_1) + C = 0$

Suku Banyak

$f(x) = P_1(x)\, P_2(x)$

$S(x) = P_1(x) \cdot S_2 + S_1$

$S(x) = \frac{x-b}{a-b} f(a) + \frac{x-a}{b-a} f(b)$

fungsi komposisi & f. Invers

$f(x) = \frac{ax+b}{cx+d}$; $f^{-1}(x) = \frac{dx+b}{cx-a}$

• $(f \circ g)^{-1} = g^{-1} \circ f^{-1}$

• $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$

• $f^{-1} \circ (f \circ g) = g(x)$

• $g^{-1} \circ (g \circ f) = f(x)$

• $g \circ f \circ f^{-1} = g(x)$

• $f \circ g \circ g^{-1} = f(x)$

• $(f \circ g \circ h)^{-1} = h^{-1} \circ g^{-1} \circ f^{-1}$

Limit

$\lim_{x \to \infty} \sqrt{ax^2+bx+c} - \sqrt{ax^2+px+r} =$

$= \frac{b-p}{2\sqrt{a}}$ | $\lim_{x \to \infty} \sqrt{a^2x^2+px+q} - (ax+b) = \frac{p-2ab}{2a}$

Kontinuitas

$f(x)$ kontinu pd $x=a$

1) $f(a) = ada$
2) $\lim_{x \to a} f(x) = ada$
3) $\lim_{x \to a} f(x) = f(a)$

Turunan

$f(x) = ax^n$

$f'(x) = a.n\, x^{n-1}$

$y = u \pm v \rightarrow y' = u' \pm v'$

$y = u.v \rightarrow y' = u'v + uv'$

$y = \frac{u}{v} \rightarrow y' = \frac{u'v - uv'}{v^2}$

$y = u^n \rightarrow y' = n.u^{n-1}.u'$

y	y'
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\sec^2 x$
$\text{cosec}\, x$	$-\text{ctg}\, x \cdot \text{cosec}\, x$
$\sec x$	$\text{tg}\, x \cdot \sec x$
$\text{ctg}\, x$	$-\text{cosec}^2 x$

kurva $f(x) = ax^2+bx+c$
melalui $x = p$

$m = f'(p) = 2a.p + b$
$= 2ap + b$

sejajar $m_\ell = m_g$

tegak lurus $m_\ell . m_g = -1$

- fungsi naik $f'(x) > 0$
- fungsi turun $f'(x) < 0$
- titik stasioner $f'(x) = 0$

⇒ Aturan l'hôpital

$\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$

TRIGONOMETRI

	0	30	45	60	90
sin	0	$\frac{1}{2}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}\sqrt{3}$	1
cos	1	$\frac{1}{2}\sqrt{3}$	$\frac{1}{2}\sqrt{2}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{3}\sqrt{3}$	1	$\sqrt{3}$	~

Kuadran I $(0°-90°)/\alpha$ = semua positif
Kuadran II $(180-\alpha)$ = sin positif
Kuadran III $(180+\alpha)$ = tg positif
Kuadran IV $(360-\alpha)$ = cos positif

$n, 2\pi + \alpha = \alpha$

$\cos(a+b) = \cos a \cos b - \sin a \sin b$

$\cos(a-b) = \cos a \cos b + \sin a \sin b$

$\sin(a+b) = \sin a \cos b + \cos a \sin b$

$\sin(a-b) = \sin a \cos b - \cos a \sin b$

$\tan(a+b) = \frac{\tan a + \tan b}{1 - \tan a \tan b}$

$\tan(a-b) = \frac{\tan a - \tan b}{1 + \tan a \tan b}$

$\sin 2\alpha = 2 \sin \alpha \cos \alpha$

$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha$
$= 2\cos^2\alpha - 1$
$= 1 - 2\sin^2\alpha$

$\tan 2\alpha = \frac{2\tan\alpha}{1 - \tan^2\alpha}$

$\sin 3\alpha = 3\sin\alpha - 4\sin^3\alpha$

$\cos 3\alpha = 4\cos^3\alpha - 3\cos\alpha$

$\sin \frac{1}{2}\alpha = \pm\sqrt{\frac{1-\cos\alpha}{2}}$

$\cos \frac{1}{2}\alpha = \pm\sqrt{\frac{1+\cos\alpha}{2}}$

$\tan \frac{1}{2}\alpha = \pm\sqrt{\frac{1-\cos\alpha}{1+\cos\alpha}}$

$2\cos a \cos b = \cos(a+b) + \cos(a-b)$

$-2\sin a \sin b = \cos(a+b) - \cos(a-b)$

$2\sin a \cos b = \sin(a+b) + \sin(a-b)$

$2\cos a \sin b = \sin(a+b) - \sin(a-b)$

$\sin A + \sin B = 2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$

$\sin A - \sin B = 2\cos\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$

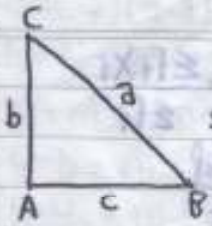
$\cos A + \cos B = 2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$

$\cos A - \cos B = -2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$

$\tan A + \tan B = \frac{\sin(A+B)}{\cos A \cdot \cos B}$

Koordinat polar = $(r, \alpha°)$

Statistik



$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc.\cos A$

$\cos A = \frac{b^2+c^2-a^2}{2bc}$

$L\Delta = \frac{1}{2}b.c \sin A$
$= \frac{1}{2}a.c \sin B$
$= \frac{1}{2}a.b \sin C$

$\sin A = \sqrt{1 - \cos^2\alpha}$

$\cos A = \sqrt{1 - \sin^2\alpha}$

$\cos\alpha = \sin\beta$

$\alpha + \beta = \frac{\pi}{2}, 2\frac{1}{2}\pi, 4\frac{1}{2}\pi, \ldots$

Integral

$f(x) = x^n$

$\int f(x)\,dx = \frac{1}{n+1} x^{n+1} + C$

$\int (ax+b)^n dx = \frac{1}{a(n+1)} (ax+b)^{n+1} + C$

Rumus² Integral Trigonometri

$\int \sin x\,dx = -\cos x + C$

$\int \cos x\,dx = \sin x + C$

$\int \sec^2 x\,dx = \tan x + C$

$\int \operatorname{ctg} x . \operatorname{cosec} x\,dx = -\operatorname{cosec} x + C$

$\int \operatorname{tg} x . \sec x\,dx = \sec x + C$

$\int \operatorname{cosec}^2 x\,dx = -\operatorname{ctg} x + C$

$\int u\,dv = u.v - \int v\,du$

$\int \sqrt{a^2 - x^2}\,dx = \frac{1}{2}x\sqrt{a^2-x^2} + \frac{1}{2}a^2 \arcsin\frac{x}{a} + C$

$x = a\sin t \quad ; \sin t = \frac{x}{a}$

$dx = a\cos t\,dt \; ; t = \arcsin\frac{x}{a}$

$\int_a^b f(x)\,dx = F(x)\Big|_a^b = F(b) - F(a)$

$V = \pi \int_a^b f(x)^2\,dx$

Program Linear

- menentukan persamaan

> diketahui 2 titik sembarang

$$\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$$

> dik. ttk potong dgn sb x & y

pd sb $x = b$; pd sb $y = a$

$ax + by = a.b$

> dik gradien & titik yg dilalui

$y - y_1 = m(x - x_1)$

Barisan, Deret, ...

> Aritmatika

$U_n = a + (n-1)b \qquad U_t = \frac{U_1 + U_n}{2}$

$b = U_n - U_{n-1}$

$S_n = \frac{n}{2}(2a + (n-1)b)$

$= \frac{n}{2}(a + U_n)$

> Geometri

$U_n = ar^{n-1}$

$r = \frac{U_n}{U_{n-1}}$

$S_n = \frac{a(1-r^n)}{1-r} \; ; r < 1$

$S_n = \frac{a(r^n-1)}{r-1} \; ; r > 1$

$U_t^2 = U_1 U_n$

> Geometri tak hingga

$S_\infty = \frac{a}{r-1} \; ; r > 1$

$S_\infty = \frac{a}{1-r} \; ; r < 1$

konvergen ; $-1 < r < 1$

divergen ; $r \le -1 \cup r \ge 1$

> Induksi Matematika

$\sum_{a=1}^{n} 4a+1 = n(2n+3)$

$S_n = 5 + 9 + 13 + \dots + (4n+1) = n(2n+3)$

- $n = 1$

$S_1 = 1(2.1+3) = 5$ (benar)

- $n = k$

$5 + 9 + 13 + \dots + (4k+1) = k(2k+3)$

- $n = k+1$

$5 + 9 + 13 + \dots + (4k+1) + (4(k+1)+1) = (k+1)(2k+2+3)$

$2k^2 + 3k + 4k + 5 = 2k^2 + 7k + 5$

$2k^2 + 7k + 5 = 2k^2 + 7k + 5$ (B)

Matriks

$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \pm \begin{pmatrix} e & f \\ g & h \end{pmatrix} = \begin{pmatrix} a \pm e & b \pm f \\ c \pm g & d \pm h \end{pmatrix}$

$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} e & f \\ g & h \end{pmatrix} = \begin{pmatrix} ae+bg & af+bh \\ ce+dg & cf+dh \end{pmatrix}$

> determinan

$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$|A| = ad - bc$

$A = \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$

$|A| = \begin{vmatrix} a & b & c & a & b \\ d & e & f & d & e \\ g & h & i & g & h \end{vmatrix}$

$= (aei + bfg + cdh) - (gec + hfa + idb)$

> Invers matriks

$A^{-1} = \frac{1}{|A|} \operatorname{adj} A \; ; A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$

$\operatorname{adj} A = \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$

$AX = B \qquad XA = B$

$X = A^{-1}.B \qquad X = B.A^{-1}$

Vektor

> $\overrightarrow{AB} = \overrightarrow{OB} - \overrightarrow{OA}$

> $AP : PB = m : n \quad AP = \frac{m}{m+n} AB$

$P = \frac{nA + mB}{m+n}$

$D = \frac{1}{2}(A+C)$;

$O = \frac{2D+B}{3}$

> segaris
$\overline{AC} = k\,\overline{AB}$

> sejajar
$|AB| = k\,|CD|$

> tegak lurus
$\vec{a} \cdot \vec{b} = 0$

> $B = (a, b, c)$
$|B| = \sqrt{a^2+b^2+c^2}$

> $\cos\alpha = \frac{\vec{a}\cdot\vec{b}}{|\vec{a}||\vec{b}|}$

> Proyeksi

$\overline{AM}$ adalah proyeksi $\overline{AB}$ terhadap $\overline{AC}$

$|AM| = \frac{\overline{AB}\,\overline{AC}}{|AB|}$

$AM = \frac{\overline{AB}\cdot\overline{AC}}{|AB|^2}\,\overline{AB}$

Transformasi

① Translasi

$T = \begin{pmatrix} a \\ b \end{pmatrix}$

$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} x \\ y \end{pmatrix} + T = \begin{pmatrix} x+a \\ y+b \end{pmatrix}$

② Rotasi

$R(O,\alpha) \rightarrow P(0,0)$

$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

$R(P,\alpha) \rightarrow P(a,b)$

$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{pmatrix} \begin{pmatrix} x-a \\ y-b \end{pmatrix} + \begin{pmatrix} a \\ b \end{pmatrix}$

③ Refleksi

> Trhdp sb x $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

> Trhdp sb y $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

> trhdp pusat $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

> grs $y = x$ $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

> grs $y = -x$ $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

> grs $x = h$ $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 2h \\ 0 \end{pmatrix}$

> grs $y = k$ $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 0 \\ 2k \end{pmatrix}$

> trhdp (a,b) $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} 2a \\ 2b \end{pmatrix}$

> trhdp $y = mx$

$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \cos 2\alpha & \sin 2\alpha \\ \sin 2\alpha & -\cos 2\alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

$\sin 2\alpha = \frac{2m}{1+m^2}$; $\cos 2\alpha = \frac{1-m^2}{1+m^2}$

> trhdp $y = ax + b$

$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \cos 2\alpha & \sin 2\alpha \\ \sin 2\alpha & -\cos 2\alpha \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \frac{b}{a} \begin{pmatrix} \cos 2\alpha - 1 \\ \sin 2\alpha \end{pmatrix}$

$\sin 2\alpha = \frac{2a}{1+a^2}$; $\cos 2\alpha = \frac{1-a^2}{1+a^2}$

④ Dilatasi

> [O,k]

$\begin{pmatrix} x' \\ y' \end{pmatrix} = k \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} kx \\ ky \end{pmatrix}$

> $[P,k] \rightarrow P(a,b)$

$\begin{pmatrix} x'-a \\ y'-b \end{pmatrix} = k \begin{pmatrix} x-a \\ y-b \end{pmatrix} = \begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix} \begin{pmatrix} x-a \\ y-b \end{pmatrix}$

$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix} \begin{pmatrix} x-a \\ y-b \end{pmatrix} + \begin{pmatrix} a \\ b \end{pmatrix}$

Bangun Ruang

> Kubus
Luas = $6s^2$
Volume = s^3

> Balok
Luas = $2((p\times\ell)+(p\times t)+(\ell\times t))$
Volume = $p\times\ell\times t$

> Prisma
Luas = luas atap + luas alas + luas bidang sisi tegak
Volume = luas alas × tinggi

> Limas
Luas = luas alas + luas bidang sisi tegak
Volume = $\frac{1}{3}$ × luas alas × t

> Kerucut
Luas = $\pi r^2 + \pi r s$
Volume = $\frac{1}{3}\pi R^2 t$

> Bola
Luas = $4\pi R^2$
Volume = $\frac{4}{3}\pi R^3$

> Tabung
Luas = $2\pi r t + 2\pi r^2$
Volume = $\pi r^2 \times t$
$\pi r^2 t$

> Persegi
$L = s\times s$; $K = 4s$

> Persegi panjang
$L = p\times\ell$; $K = 2p+2\ell$

> Jajargenjang
$L = a\times t$; $K = 2a+2s$

> Belah ketupat
$L = \frac{1}{2} d_1 \times d_2$; $K = 4s$

> Layang²
$L = \frac{1}{2} d_1 \times d_2$; $K = 2s + 2s$

> Trapesium
$L = \frac{1}{2} t\,(a\times b)$ $K = s+s+s+s$

> Lingkaran
$L = \pi r^2$ $K = \pi d$