PERTEMUAN 7

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$Rumus - rumus\ turunan\ fungsi\ eksponen$

$(1) f(x) = e^x \Rightarrow f'(x) = e^x$

$(2) f(x) = e^{gx} \Rightarrow f'(x) = e^{gx}.g'(x)$

$(3) f(x) = a^x \Rightarrow f'(x) = a^x lna,\ a > 0\ ; a \neq 1$

$(4) f(x) = a^{g(x)} \Rightarrow f'(x) = a^{g(x)}.g'(x); a > 0\ dan\ a \neq 1$

Sifat − sifat Logaritma Natural

$(1) e^{lna} = a$

$(2) ln\ ab = lna + lnb$

$(3) ln\ \frac{a}{b} = ln\ a - ln\ b$

$(4) ln\ a^n = n.ln\ a$

$(5) ln\ e^n = n\ [\because lne = 1]$

Rumus − rumus Turunan Fungsi Logaritma

$(1) y = log_a x \Rightarrow y' = \frac{1}{x\ loga}$

$(2) y = log_a g(x) \Rightarrow y' = \frac{g'(x)}{g(x)\ loga}$

$(3) y = ln\ x \Rightarrow y' = \frac{1}{x}$

$(4) y = ln\ g(x) \Rightarrow y' = \frac{g'(x)}{g(x)}$

Rumus Turunan Fungsi Trigonometri

1. $y = \sin x \rightarrow y' = \cos x$
2. $y = \cos x \rightarrow y' = -\sin x$
3. $y = \tan x \rightarrow y' = \sec^2 x$
4. $y = \cot x \rightarrow y' = -\csc^2 x$
5. $y = \sec x \rightarrow y'$
6. $y = \csc x \rightarrow -\csc \times \cot x$
7. $y = \sin^n x y' = n \sin^{n-1} \times \cos x$
8. $y = \cos^n x \rightarrow y' = -n \cos^{n-1} \times \sin x$
9. $y = \sin u \rightarrow y' = u' \cos u$
10. $y = \cos u \rightarrow y' = -u' \sin u$
11. $y = \tan u \rightarrow y' = u' \sec^2 u$
12. $y = \cot u \rightarrow y' = -u' \csc^2 u$
13. $y = \sec u \rightarrow y' = u' \sec u \tan u$
14. $y = \csc u \rightarrow y' = -u' \csc u \cot u$
15. $y = \sin^n u \rightarrow y' = n.u' \sin^{n-1} \cos u$
16. $y = \cos^n u \rightarrow y' = -n \cdot u' cos^{n-1} u \cdot \sin u$

Contoh Soal

1. $y = Sin\ 2x\ maka\ y' = 2\ Cos\ 2x$

2. $y = Cos\ (3x + 1)\ maka\ y' = -3Sin\ (3x + 1)$

3. $y = Sin\ (3x - 2)\ Cos\ 2x$

Jawab

$y = Sin\ (3x - 2)\ Cos\ 2x$

$U = Sin\ (3x - 2)\ maka\ U' = 3\ Cos\ (3x - 2)$

$V = Cos\ 2x\ maka\ V' = -2Sin\ 2x$

$y' = U'V + V'U$

$y' = 3\ Cos\ (3x - 2)(Cos\ 2x) + (-2Sin\ 2x)(Sin\ (3x - 2)$

4. $y = \frac{Sin\ x}{Tan\ x}$

Jawab

$y = \frac{Sin\ x}{Tan\ x}$

$U = Sin\ x\ maka\ U' = Cos\ x$

$V = Tan\ x\ maka\ V' = Sec^2 x$

$y' = \frac{U'V - V'U}{V^2}$

$y' = \frac{Cos\ x\ Tan\ x - Sec^2 x\ Sin\ x}{Tan^2 x}$

5. $y = {}^2logx$

$y' = \frac{1}{x}\ {}^2Log\ e$

Contoh Soal

$$y = \frac{\sin x}{\sin x + \cos x}$$

Menentukan y'

Misal :

$u = \sin x$, maka $u' = \cos x$

$v = \sin x + \cos x$, maka $v' = \cos x - \sin x$

Jika $y = \frac{u}{v}$, maka:

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

$$= \frac{(\cos x)(\sin x + \cos x) - (\sin x)(\cos x - \sin x)}{(\sin x + \cos x)^2}$$

$$= \frac{\sin x \cos x + \cos^2 x - \sin x \cos x + \sin^2 x}{(\sin x + \cos x)^2}$$

$$= \frac{1}{(\sin x + \cos x)^2}$$

Latihan Soal

	$y = {}^{2}Log(2x^3 - x^2 + x - 5)$
	$y = {}^{(2x+1)}Log(x - 2)$
	$y = \ln(x^2 - 3x + 2)$
	$y = 3^{3x^2-2x+1}$
	$y = e^{3x^2-2x+1}$
	$y = Sin\ 2x\ Cos\ 5x$
	$y = Tan\ 2x\ Cos\ (5x - 2)$
	$y = \frac{Cos\ x}{Sin\ x}$
	$y = \frac{Cos\ (2x - 1)}{Tan\ x}$
	$y = \frac{Sec\ x}{Cos\ x}$