

Logaritma



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JURDIKMAT FPMIPA UPI BANDUNG

Definisi: logaritma bilangan

Jika x adalah bilangan positif dan a bilangan positif dengan $a \neq 1$, maka berlaku

$${}^a \log x = y \text{ jika dan hanya jika } x = a^y$$

Sifat-sifat:

$$1. {}^a \log x \times y = {}^a \log x + {}^a \log y$$

$$2. {}^a \log \left(\frac{x}{y} \right) = {}^a \log x - {}^a \log y$$

$$3. {}^a \log x^n = n {}^a \log x$$

$$4. {}^a \log x = \frac{{}^b \log x}{{}^b \log a}$$

$$5. {}^a \log x = \frac{1}{{}^x \log a}$$

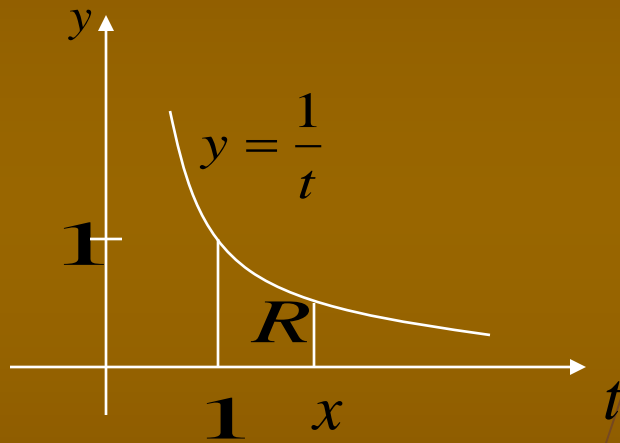
$$6. {}^a \log x \times {}^x \log y = {}^a \log y$$

$$7. {}^{a^n} \log x^m = \frac{m}{n} {}^a \log x$$

$$8. a^{{}^a \log x} = x$$

$$9. a^m \cdot {}^{a^n} \log x = x^{\frac{m}{n}}$$

Asal mula logaritma



$${}^e \log x = \ln x$$

$$\int_1^x \frac{1}{t} dt = L(R)$$

Definisi:

Fungsi logaritma asli,
yaitu,

$${}^e \log x = \int_1^x \frac{1}{t} dt$$

e adalah bilangan
euler $e \approx 2,7182818$

Hubungan log umum dengan ln

Misalkan:

$$y = {}^a \log x$$

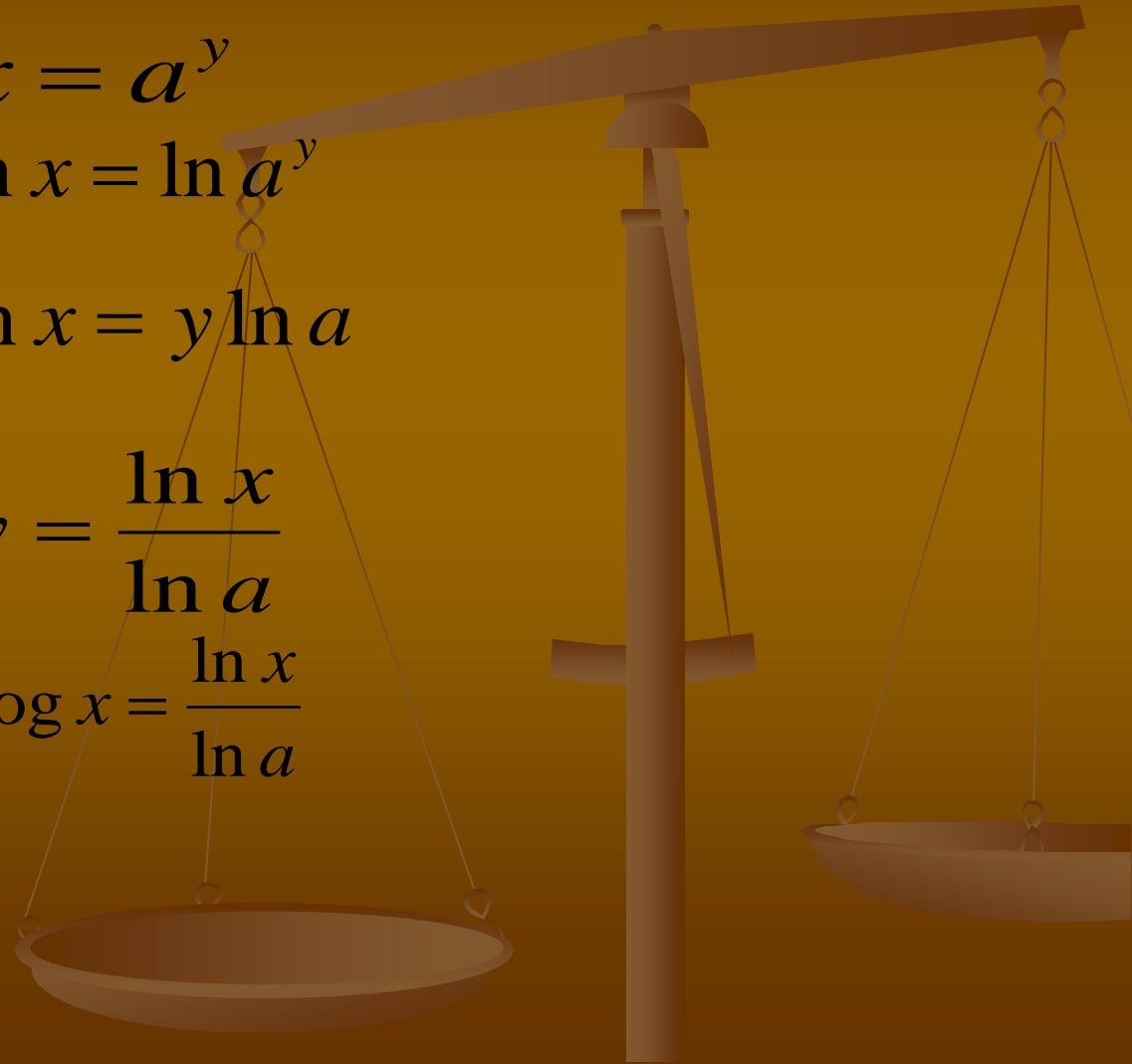
$$\Leftrightarrow x = a^y$$

$$\Leftrightarrow \ln x = \ln a^y$$

$$\Leftrightarrow \ln x = y \ln a$$

$$\Leftrightarrow y = \frac{\ln x}{\ln a}$$

$$\Leftrightarrow {}^a \log x = \frac{\ln x}{\ln a}$$



Soal:

1. Sederhanakan: $4^{\sqrt{2} \log 10}$

2. Jika ${}^b \log \sqrt[3]{\frac{y}{x}} = n$, tentukan ${}^b \log \sqrt[5]{\left(\frac{x}{y}\right)^3}$

3. Jika $\log \frac{1}{2} p + q = \frac{1}{2} \log p + \frac{1}{2} \log q$, tunjukkan bahwa $p = q$

