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Kelas : IF3A

1. Jika log(10)=1 dan log(100)=2, maka carilah:
   a) log(75)
   b) log(25)
   c) persamaan interpolasinya

2. jika log(10)=1, log(100)=2 dan log(1000)=3, maka carilah:
   a) log(250)
   b) log(750)
   c) persamaan interpolasinya

jawab

1. (log(10),1) dan (log(100),2)

x1 = log(10), y1 = 1
x3 = log(100), y3 = 2

a.) log(75)
x2= log(75) y2 = ?

$$y = y1 + \frac{(x2 - x1)(y3 - y1)}{x3 - x1}$$

$$y = 1 + \frac{(\log(75) - \log(10))(2-1)}{\log(100) - \log(10)} = 1 + \frac{(0.87)1}{1} = 1.87$$

b.) log(25)
x2 = log(25) y2= ?

$$y = 1 + \frac{(\log(25) - \log(10))(2-1)}{\log(100) - \log(10)} = 1 + \frac{(0.3979)1}{1} = 1.3979$$

c. Persamaan Interpolasi

Rumus, $y2 = \frac{(x3 - x2)(y3 - y1)}{(x3 - x2) + y3}$

a.) $y2 = \frac{(\log(100) - \log(75))(2-1)}{(\log(100) - \log(75)) + 2} = \frac{(0.12)(1)}{0.12 + 2} = \frac{0.12}{2.12} = 0.056$

b.) $y2 = \frac{(\log(100) - \log(25))(2-1)}{(\log(100) - \log(25)) + 2} = \frac{(0.60)(1)}{0.60 + 2} = \frac{0.60}{2.60} = 0.23$

2. (log(10),1) dan (log(100),2) dan (log(1000),3)

$(\log(10), 1) \rightarrow x + 10y + 100z = 1$
$(\log(100), 2) \rightarrow x + 100y + 10000z = 2$
$(\log(1000), 3) \rightarrow x + 1000y + 1000000z = 3$

a.) log(250)

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 1 & 100 & 10000 & 2 \\ 1 & 1000 & 1000000 & 3 \end{bmatrix}$$

$1(-1)+1=0$

$10(-1)+100=90$

$100(-1)+1000=900$

$1(-1)+2=1$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 90 & 900 & 1 \\ 1 & 1000 & 1000000 & 3 \end{bmatrix}$$

$1(-1)+1=0$

$10(-1)+1000=990$

$100(-1)+1000000=999900$

$1(-1)+3=2$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 90 & 900 & 1 \\ 0 & 990 & 999900 & 2 \end{bmatrix}$$

$\frac{90}{90}=1$

$\frac{900}{90}=10$

$\frac{1}{90}=\frac{1}{90}$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 1 & 10 & \frac{1}{90} \\ 0 & 990 & 999900 & 2 \end{bmatrix}$$

$10(-99)+990=0$

$100(-99)+999900=998910$

$1(-99)+2=-97$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 1 & 10 & \frac{1}{90} \\ 0 & 0 & 998910 & -97 \end{bmatrix}$$

$\frac{998910}{998910}=1$

$\frac{-97}{998910}=-\frac{97}{998910}$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 1 & 10 & \frac{1}{90} \\ 0 & 0 & 1 & -\frac{97}{998910} \end{bmatrix}$$

$$z=-\frac{97}{998910}=-0.00097$$
$$y+10z=\frac{1}{90}$$
$$y+10\left(-\frac{97}{998910}\right)=\frac{1}{90}$$
$$y-\frac{970}{998910}=\frac{1}{90}$$
$$y=\left(\frac{1}{90}\right)+\frac{970}{998970}$$
$$y=\frac{36209}{2996910}$$
$$y=0.012$$

$$x+10y+100z=1$$
$$x+10(0.012)-0.000097=1$$
$$x+0.12-0.000097=1$$
$$x+0.119903=1$$
$$x=1-0.119903$$
$$x=0.88097$$

$$\log(250)=0.88097+0.012x-0.000097x^2$$
$$\log(250)=0.88097+0.012(250)-0.000097(250)^2$$
$$\log(250)=0.88097+3-6.0625$$
$$\log(250)=-2.18153$$

b.)log(750)

$$\begin{bmatrix}1 & 10 & 100 & 1\\ 1 & 100 & 10000 & 2\\ 1 & 1000 & 1000000 & 3\end{bmatrix}$$
$$1(-1)+1=0$$
$$10(-1)+100=90$$
$$100(-1)+1000=900$$
$$1(-1)+2=1$$

$$\begin{bmatrix}1 & 10 & 100 & 1\\ 0 & 90 & 900 & 1\\ 1 & 1000 & 1000000 & 3\end{bmatrix}$$
$$1(-1)+1=0$$
$$10(-1)+1000=990$$
$$100(-1)+1000000=999900$$
$$1(-1)+3=2$$

$$\begin{bmatrix}1 & 10 & 100 & 1\\ 0 & 90 & 900 & 1\\ 0 & 990 & 999900 & 2\end{bmatrix}$$
$$\frac{90}{90}=1$$

$$\frac{900}{90}=10$$
$$\frac{1}{90}=\frac{1}{90}$$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 1 & 10 & \frac{1}{90} \\ 0 & 990 & 999900 & 2 \end{bmatrix}$$
$$10(-99)+990=0$$
$$100(-99)+999900=998910$$
$$1(-99)+2=-97$$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 1 & 10 & \frac{1}{90} \\ 0 & 0 & 998910 & -97 \end{bmatrix}$$
$$\frac{998910}{998910}=1$$
$$\frac{-97}{998910}=-\frac{97}{998910}$$

$$\begin{bmatrix} 1 & 10 & 100 & 1 \\ 0 & 1 & 10 & \frac{1}{90} \\ 0 & 0 & 1 & -\frac{97}{998910} \end{bmatrix}$$

$$z=-\frac{97}{998910}=-0.00097$$
$$y+10z=\frac{1}{90}$$
$$y+10(-\frac{97}{998910})=\frac{1}{90}$$
$$y-\frac{970}{998910}=\frac{1}{90}$$
$$y=(\frac{1}{90})+\frac{970}{998970}$$
$$y=\frac{36209}{2996910}$$
$$y=0.012$$

$$x+10y+100z=1$$
$$x+10(0.012)-0.000097=1$$
$$x+0.12-0.000097=1$$
$$x+0.119903=1$$
$$x=1-0.119903$$
$$x=0.88097$$
$$\log(750)=0.88097+0.012x-0.000097x^2$$
$$\log(750)=0.88097+0.012(750)-0.000097(750^2)$$

$$\log(750) = 0.88097 + 9 - 54.6$$
$$\log(750) = 0.088097 - 45.56$$
$$\log(750) = -45.471903$$

c.) Persamaan interpolasi

a) log(250)

$$\log(250) = 0.88097 + 0.012\,x - 0.00097\,x^2$$

b) log(750)

$$\log(750) = 0.88097 + 0.012\,x - 0.00097\,x^2$$