Nama : Eko Saputra
NIM : 201420001
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)

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

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

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

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

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

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

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

$$10(-99)+990=0$$

$$100(-99)+999900=998910$$

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

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

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

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

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

$$z=-\frac{97}{998910}=-0.00097$$

$$y+10z=\frac{1}{90}$$

$$y+10\left(-\frac{97}{998910}\right)=\frac{1}{90}$$

$$y-\frac{970}{998910}=\frac{1}{90}$$

$$y=\left(\frac{1}{90}\right)+\frac{970}{998970}$$

$$y=\frac{36209}{2996910}$$

$$y=0.012$$

$$x+10y+100z=1$$

$$x+10(0.012)-0.000097=1$$

$x + 0.12 - 0.000097 = 1$
$x + 0.119903 = 1$
$x = 1 - 0.119903$
$x = 0.88097$
$\log(750) = 0.88097 + 0.012\,x - 0.000097\,x^2$
$\log(750) = 0.88097 + 0.012(750) - 0.000097(750^2)$
$\log(750) = 0.88097 + 9 - 54.6$
$\log(750) = 0.088097 - 45.56$
$\log(750) = -45.471903$

c.) Persamaan interpolasi

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

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