Nama : Faiz Hidayat
NIM : 201420026
Kelas : IF3A
UAS : Analysis Numerik

1. Selesaikan sistem persamaan berikut dengan metode eliminasi gauss:

$x_1+2_{x2}+x_3=2$
$3_{x1}+6_{x2}=9$
$2_{x1}+8_{x2}+4_{x3}=6$

2. Jika log(10) =1 dan log(100)=2, carilah:

$a.\log(75)$
$b.\log(25)$
$c.$ *persamaan interpolasinya*

3. cari akar pendekatan fungsi $f(x)=x^3-x-1, a=0{,}1\ dan\ x_0=2$

4. Gunakan aturan Trapesium dan Simpson untuk mencari suatu nilai hampiran untuk;
$Y=X^4$ **, dengan mengambil batas x=1 dan x=4, serta subinterval (n=8).**

5. Tentukan deret Taylor dan deret Maclaurent dari fungsi;

$a.F(x)=\cos(x).$
$b.F(x)=\ln(x+1)$

Jawab

1. $\begin{bmatrix}1&2&3&2\\3&6&0&9\\2&8&4&6\end{bmatrix}\quad\begin{bmatrix}i\\ii\\iii\end{bmatrix}$

$$\begin{bmatrix}1&2&3&2\\0&0&-9&3\\0&4&-2&2\end{bmatrix}$$

$$\begin{bmatrix}1&2&3&2\\0&4&-2&2\\0&0&-9&3\end{bmatrix}$$

$$\begin{bmatrix}1&2&3&2\\0&1&-0{,}5&0{,}5\\0&0&-9&3\end{bmatrix}$$

$$\begin{bmatrix}1&0&4&1\\0&1&-0{,}5&0{,}5\\0&0&1&\frac{-1}{5}\end{bmatrix}$$

$x_1=\frac{7}{3}$
$x_2=\frac{1}{3}$
$x_3=\frac{-1}{3}$

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

3. $f(x) = x^3 - x - 1, batas\ \partial = 0,1$

Iterasi	x_0	x_1	x_2	$F(X_0)$	$F(X_2)$	$F(X_0).F(X_2)$	$\lvert X_0 - X_1 \rvert$
1	2	2	1,5	-1	0,875	-0,875	1
2	1,5	1,5	1,25	-1	-0,297	0,297	0,5
3	1,5	1,5	1,375	-0,297	0,225	-0,067	0,25
4	1,375	1,375	1,312	-0,297	-0,053	0,016	0,125

Disimpulkan nilai X mendekati adalah x = 1,312

4. $h = \frac{4-1}{8} = \frac{3}{8}$

$$I = \frac{\frac{3}{8}}{2} x (f(0) + 2f(\tfrac{3}{8}) + 2f(\tfrac{3}{4}) + 2f(\tfrac{9}{8}) + 2f(\tfrac{3}{2}) + 2f(\tfrac{15}{8}) + 2f(\tfrac{9}{4}) + 2f(\tfrac{21}{8}) + 2f(3))$$

$$I = \frac{3}{16}(0 + 0{,}039 + 0{,}632 + 3{,}203 + 10{,}125 + 24{,}719 + 51{,}257 + 94{,}961 + 162) = 65{,}05$$

5.a. f (x)=cos x

$$\cos x = 1 - \frac{1}{2!}x^2 + \frac{1}{4!}x^4 - \frac{1}{6!}x^6 + \frac{1}{8!}x^8 + \ldots$$

5.b. f (x)=ln (1+x)

deret taylor

$$f(0)=0+\frac{\frac{d}{dx}(\ln(1+x))(0)}{1!}x+\frac{\frac{d^2}{dx\,2}(\ln(1+x))(0)}{2!}x^2+\frac{\frac{d^3}{dx\,3}(\ln(1+x))(0)}{3!}x^3+\ldots$$

deret maclaurin

$$f(0)=0+\frac{\frac{d}{dx}(\ln(1+x))(0)}{1!}x+\frac{\frac{d^2}{dx^2}(\ln(1+x))(0)}{2!}x^2+\frac{\frac{d^3}{dx^3}(\ln(1+x))(0)}{3!}x^3+\ldots$$