Nama : Dimas Setiaji
NRP : 5025291056
Kelas : KomNum A

No.
Date

* Soal 2 - Part. 1b - Trapesium & Simpson

↔ Diket. $f(x) = 3x^5 - 8x^4$ dgn batas atas = 16 & bawah = 9

Ditanya. : a Cari hasil fungsi $f(9), f(7), f(10), f(13), f(16)$

a Cari luas persamaan dengan Simpson 1/3 segmen berganda & error dari hasilnya

→ Dijawab:

a) $\int_9^{16} 3x^5 - 8x^4 \, dx = \left[\frac{3x^6}{6 \cdot 2} - \frac{8x^5}{5} \right]_9^{16}$

$= \left(\frac{16.777.216}{2} - \frac{8(1048576)}{5} \right) - \left(\frac{4096}{2} - \frac{8(1024)}{5} \right)$

$= 8388608 - \frac{8388608}{5} - \left(2048 - \frac{8192}{5} \right)$

$= \frac{8388608(5-1)}{5} - (2048 - 1638,4)$

$= \frac{8388608 \cdot 4}{5} - 409,6$

$= 6710886,4 - 409,6$

⇒ Nilai sebenarnya = $\boxed{6710476,8}$

a) $f(9) = 3(9)^5 - 8(9)^4 = 3(1024) - 8(256) = 3072 - 2048 = 1024$

a) $f(7) = 3(7)^5 - 8(7)^4 = 3(16807) - 8(2401) = 50421 - 19208 = 31213$

a) $f(10) = 3(10)^5 - 8(10)^4 = 3(100000) - 8(1000) = 300000 - 8000 = 220000$

a) $f(13) = 3(13)^5 - 8(13)^4 = 3(371293) - 8(28561) = 1113879 - 228488 = 885391$

a) $f(16) = 3(16)^5 - 8(16)^4 = 3(1048576) - 8(65536) = 3145728 - 524288 = 2621440$

⇒ Ada 4 segmen atau 5 titik

$X_0 = 9 \quad X_1 = 7 \quad X_2 = 10 \quad X_3 = 13 \quad X_4 = 16$

Date

o) Ada 5 titik, maka ada 4 segmen (n=4, harus genap)

o) L simpson 1/3 segmen berganda

$$\Rightarrow \frac{(b-a)}{3.n}\left[f(X_0) + 4\sum_{i=\text{odd}}^{n-1} f(X_i) + 2\sum_{j=\text{even}}^{n-2} f(X_j) + f(X_n) \right]$$

$$\Leftrightarrow \frac{(b-a)}{3n}\left[f(X_0) + 4\left(f(X_1) + f(X_3)\right) + 2\left(f(X_2)\right) + f(X_4) \right]$$

$$\Leftrightarrow \frac{(16-4)}{3.4}\left[f(4) + 4\left(f(7) + f(13)\right) + 2\left(f(10)\right) + f(16) \right]$$

$$\Leftrightarrow \frac{12}{12}\left[1024 + 4\left(31213 + 885391\right) + 2\left(220000\right) + 2621440 \right]$$

$$\Rightarrow 1.\left(1024 + 3666916 + 440000 + 2621440\right) = \boxed{6728880}$$

o) $E_t = \left| \frac{\text{Nilai sebenarnya} - \text{Nilai Aproksimasi}}{\text{Nilai sebenarnya}} \right| . 100\%$

$$= \left| \frac{6710476,4 - 6728880}{6710476,4} \right| . 100\%$$

$$= \boxed{0,27\%}$$

Nama : Dimas Setiaji
NRP : 5025241056
Kelas : KomNum A

No.
Date . .

* Soal 2 - Pert 13 - Trapesium Segmen Berganda

⇨ Diket. $f(x) = 3x^5 - 8x^4$ dgn batas atas = 16 & bawah = 4

⇨ Dit : - Cari hasil fungsi $f(4), f(7), f(10), f(13), f(16)$
- Cari luas persamaan dgn metode Trapesium Segmen Berganda & error

⇨ Dijawab : Ada 5 titik $(x_0, x_1, x_2, x_3, x_4)$ atau 4 segmen $(n = 4)$

⇨ $f(4) = 3(4)^5 - 8(4)^4 = 3072 - 2048 = 1024$

⇨ $f(7) = 3(7)^5 - 8(7)^4 = 50421 - 19208 = 31213$

⇨ $f(10) = 3(10)^5 - 8(10)^4 = 300000 - 80000 = 220000$

⇨ $f(13) = 3(13)^5 - 8(13)^4 = 1113879 - 228488 = 885391$

⇨ $f(16) = 3(16)^5 - 8(16)^4 = 3145728 - 524288 = 2621440$

⇨ $L_{\text{trapesium segmen berganda}} = \frac{(b-a)}{2n}\left[f(x_0) + 2\sum_{i=1}^{n-1} f(x_i) + f(x_n)\right]$

⇨ $\frac{(b-a)}{2n}\left[f(x_0) + 2(f(x_1) + f(x_2) + f(x_3)) + f(x_4)\right]$

⇨ $\frac{(16-4)}{2.4}\left[1024 + 2(31213 + 220000 + 885391) + 2621440\right]$

⇨ $\frac{12^3}{8}\left[1024 + 2273208 + 2621440\right] = \frac{3}{2} \cdot 4895672 = \boxed{7343508}$

⇨ $\int_4^{16} 3x^5 - 8x^4 = \left[\frac{3x^6}{6} - \frac{8x^5}{5}\right]_4^{16} = \left(\frac{1}{2} \cdot 16777216 - \frac{8}{5} \cdot 1048576\right) - \left(\frac{1}{2} \cdot 4096 - \frac{8}{5} \cdot 1024\right)$

⇨ $(8388608 - 1677721,6) - (2048 - 1638,4)$

⇨ $6710886,4 - 409,6 = \boxed{6710476,8}$

⇨ $Et = \left|\frac{\text{Nilai sebenarnya} - \text{Nilai aproksimasi}}{\text{Nilai sebenarnya}}\right| . 100\%$

$= \left|\frac{6710476,8 - 7343508}{6710476,8}\right| . 100\%$

$= \frac{633031,2}{6710476,8} . 100\% = \boxed{9,43\%}$