

$$E_{\text{exact}} = |T - Q| \quad (2)$$

$$= |e^{0.1} - (1 + 0.1 + \frac{(0.1)^2}{2})|$$

$$= |1.709 \times 10^{-4}| \quad (2)$$

$$T = 1.1051709 = e^{0.1} \quad (2)$$

$$Q = 1.105 = \frac{221}{200} \quad (2)$$

$$R_{\text{exact}} = \frac{E_{\text{exact}}}{|T|} = 1.546 \times 10^{-4} \quad (2)$$

$$R = \frac{E_{\text{exact}}}{|Q|}$$

السؤال الثاني (20)

$$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)} \quad (6)$$

$$f'(x) = e^x + 1 \quad (4)$$

n	x_n	$f(x_n)$	$f'(x_n)$
0	1	-0.2817	3.71828
1	1.0757	0.008002	3.932236
2	1.0737	0.000006	3.92627

$$x_1 = 1.0757$$

$$x_2 = 1.0737$$

الذي المطلوب

$$x_2 = 1.07373048$$

$$f(x_2) = 0.00000606 < 0.0001$$

السؤال الثالث (30)

$$S(x) = \begin{cases} 2 - 3(x-1)^2 \\ b + 2c(x-2) + 3d(x-2)^2 \end{cases} \quad (3)$$

$$S''(x) = \begin{cases} -6(x-1) \\ 2c + 6d(x-2) \end{cases} \quad (3)$$

المسألة الأولى (10)

$$\left| x \cdot \frac{f'(x)}{f(x)} \right| = \text{السرد النسبي}$$

$$f'(x) = \frac{\cos(x)(1+\cos(x)) + \sin(x)}{(1+\cos(x))^2}$$

$$\left| x \cdot \frac{1+\cos(x)}{\sin(x)} \cdot \frac{\cos(x)(1+\cos(x)) + \sin(x)}{(1+\cos(x))^2} \right|$$

$$= \left| x \cdot \frac{1}{\sin(x)} \right| = \left| \frac{x}{\sin(x)} \right|$$

$$x = 3.1419068$$

$$\text{السرد النسبي} = 10001.40937 > 1$$

معرفة (2)

السؤال الثاني (16)

$$= \text{خطا الاعتدال} \quad \square$$

$$\left| \frac{x^{n+1} f^{(n+1)}(x)}{(n+1)!} \right|$$

$$f(x) = e^x, f'(x) = e^x, f''(x) = e^x$$

$$\max f''(x) = e^1 = 2.718281828$$

$$E_{\text{max}} = \frac{\max |x^{n+1}| \max |f^{(n+1)}(x)|}{(n+1)!}$$

$$E_{\text{max}} = \frac{e}{3!} = \frac{e}{6} = 0.45304697$$

$$E_{\text{max}} = 0.045304697$$

تقبل مع انقاص درجة واحدة

$$h = 0.5 \quad (4) \quad \text{في المثلثات}$$

$$f'(0.5) = \frac{1}{2h} [-3f(0.5) + 4f(1) - f(1.5)]$$

$$= \frac{127}{20} = 6.35 \quad (6)$$

$$f'(1) = \frac{1}{2h} [-f(0.5) + f(1.5)]$$

$$= \frac{25}{4} = 6.25 \quad (6)$$

$$f'(1.5) = \frac{1}{2h} [f(0.5) - 4f(1) + 3f(1.5)]$$

$$= \frac{123}{20} = 6.15 \quad (6)$$

تكملة الجواب

$$I(f) = \frac{h}{3} [y_0 + 4y_1 + y_2]$$

$$= \frac{0.5}{3} [f(0.5) + 4f(1) + f(1.5)]$$

$$= \frac{163}{24} = 6.79166667 \quad (6)$$

دورة تحليل أول
2024-2025

تكملة السؤال الرابع

① شرط الاتصال
(استمرارية C^0)

$$S_j(x_{j+1}) = S_{j+1}(x_{j+1})$$

$$S_2(x_1) = S_1(x_1), \quad x_1 = 2$$

$$1 = a \Rightarrow \boxed{a = 1} \quad (6)$$

② شرط C^1 (استمرارية C^1)

$$S'_j(x_{j+1}) = S'_{j+1}(x_{j+1}) \quad (6)$$

$$S'_2(x_1) = S'_1(x_1), \quad x_1 = 2$$

$$-1 = b \Rightarrow \boxed{b = -1}$$

③ شرط C^2 (استمرارية C^2)

$$S''_j(x_{j+1}) = S''_{j+1}(x_{j+1}) \quad (6)$$

$$S''_2(x_1) = S''_1(x_1), \quad x_1 = 2$$

$$-6 = 2c \Rightarrow \boxed{c = -3}$$

④ شرط استمرارية التماس

$$S''(x_0) = 0$$

$$S''(x_n) = 0 \quad (6)$$

$$S''(1) = 0$$

$$S''(3) = -6 + 6d = 0 \Rightarrow \boxed{d = 1}$$