

3.4.6

for simpsons method

$$I_n = \frac{h}{3} (f_0 + 4f_1 + 2f_2 + 4f_3 + 2f_4 + \dots$$

$$2f_{n-2} + 4f_{n-1} + f_n)$$

$$E_n = I(f) - I_n(f) = \frac{-h^4}{180} (f^{(3)}(b) - f^{(3)}(a))$$

$$\begin{aligned} f''(x) &= e^x (\cos x - \sin x) - (e^x \sin x + e^x \cos x) \\ &= -2e^x \sin x \end{aligned}$$

$$f'''(x) = -2(e^x \sin x + e^x \cos x)$$

$$f'''(a) = f'''(0) = -2 \quad f'''(b) = f'''(\pi) = 2e^\pi$$