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Name:
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Tutorial 2

Any marks received for the tutorial are only indicative and may be subject to moderation and scaling.

Exercise 1 (Taylor series methods) % of CW mark: 0.5

Write down the TS(2) method for the initial value problem

$$x'' + 3x' + 2x = t^2, \quad x(t_0) = \alpha, \quad x'(t_0) = \beta, \quad t \in [t_0, t_f].$$

Exercise 2 (Global error) % of CW mark: 1.5

Estimate the global error $|e_n|$ of the TS(2) method for the initial value problem

$$x' = \lambda x + g(t), \quad x(t_0) = \alpha, \quad t \in [t_0, t_f],$$

where $\lambda = const$, g is a function differentiable as many times as needed.
Assumptions: $e_0 = 0$; the reminder $R = O(h^3) \leq Ch^3$, $C = const \geq 0$.

Exercise 3 (Global error) % of CW mark: 2.0
Mastery Component

Estimate the global error $|e_n|$ of the Trapezoidal rule for the initial value problem

$$x' = \lambda x + g(t), \quad x(t_0) = \alpha, \quad t \in [t_0, t_f],$$

where $\lambda = const$, g is a function differentiable as many times as needed.
Assumptions: $e_0 \leq Ch^2$, $C = const \geq 0$; the reminder $R = O(h^3) \leq Ch^3$, $C = const \geq 0$; $h\lambda < 2$; $g(t_n) = g_n$, $g(t_{n+1}) = g_{n+1}$.