Name:
CID:

Tutorial 7

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

Exercise 1 (**Absolute stability**) — % of CW mark: 1.0

Find the interval of absolute stability of the Trapezoidal rule.

Exercise 2 (**Absolute stability**) — % of CW mark: 1.0

Find the restriction on the time step for which Euler's method is absolutely stable when applied to the equation

$$x' = \lambda x,\ \lambda = -4 + 3i\,.$$

Exercise 3 (**Absolute stability for systems**) — % of CW mark: 1.5

Find the restriction on the time step for which Euler's method is absolutely stable when applied to the system of equations

$$\begin{pmatrix} u_1' \\ u_2' \end{pmatrix} = \begin{pmatrix} -1 & 1 \\ -1 & -1 \end{pmatrix} \begin{pmatrix} u_1 \\ u_2 \end{pmatrix}.$$

Exercise 4 (**PECE**) — % of CW mark: 2.0
Mastery Component

Combine the Euler method and Trapezoidal rule into a predictor-corrector method, and calculate the local truncation error and interval of absolute stability of the method when applied to the equation

$$x' = \lambda x,\ Re(\lambda) < 0\,.$$