EML3041 Computational Methods
Fall 2023
Week 13: November 13-November 17

Answer each question in sequence on a fresh sheet of paper. Solve the problem as if you were submitting them for a test. Identify each part separately if a question has parts. Submit **problem #2** at the end of class.

1) Find the exact value of the integral

$$\int_3^5 13x\,dx$$

Answer: 104

2) Given the following ordinary differential equation

$$\frac{dy}{dx} = 13x, y(3) = 37$$

a) Find the exact solution of the ordinary differential equation using classical solution technique (finding homogeneous part and particular part of the solution).
b) Find the value of $y(5)$.
c) Find the value of $y(5) - y(3)$.
d) Is the value you obtain in part (b) or part (c) same as Problem#1?
e) Why is the value you obtain in part (c) same or different from Problem#1.
Answer: b) 141

3) Given the following ordinary differential equation

$$\frac{dy}{dx} = 13x, y(3) = 37$$

a) Find the value of $y(5)$ using Euler's method. Choose a step size of $h = 1$.
b) What is the true error in part (a).
c) Would answer to part (a) be the estimate of $\int_3^5 13x\,dx$ using Euler's method with step size of $h = 1$.
d) If part (a) is not the estimate of $\int_3^5 13x\,dx$ using Euler's method, what do you need to do to the answer in part (a) so that it is.
Answer: a) 128 b) 13

	The QR code is the link to the textbook – use it for reference and solving more problems if finished. Alternatively, use a short link if you wish: https://bit.ly/3RMpaAe