MATH6103 Differential & Integral Calculus

MATH6500 Elementary Mathematics for Engineers

Problem Sheet 7

Deadline: **Monday 30 November, 5:00**.
Hand in to **drop box 5** in the undergraduate common room (maths department, room 502).

Hand in the questions marked with an asterisk (*).

One mark will be deducted if you do not **staple your work**.

* 1) A car is accelerating down a straight road. Its velocity, vm/s, at time t seconds is given by:

$$v(t) = 10t$$

How far has the car travelled when it reaches 30m/s?

2) Find the area of the finite region between $y = e^x - 1$ and $y = (e^2 - 1)x$.
(Hint: *This area is between* $x = 0$ *and* $x = 1$)

3) Use the trapezium method with 4 trapeziums to estimate $\displaystyle\int_0^2 x^2 \, dx$.

* 4a) Use the trapezium method with 4 trapeziums to estimate $\displaystyle\int_0^1 \frac{1}{1+x^2} \, dx$.

* 4b) Find $\displaystyle\int_0^1 \frac{1}{1+x^2} \, dx$ exactly.

* 5) Find an integral for which the trapezium method always gives an underestimate. Explain why.