

# Mech 2 Math Suggested Problems Week #2

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1. Experimental Measurements determine that a function  $f(x)$  satisfies  $f(0) = 0$ ,  $f(1/4) = 1$ ,  $f(1/2) = 3$ ,  $f(3/4) = 6$  and  $f(1) = 8$ .
  - (a) Estimate  $\int_0^1 f(x)dx$  using the *Trapezoidal* rule.
  - (b) Estimate  $f''(1/4)$ ,  $f''(1/2)$ , and  $f''(3/4)$  using centred difference approximations to the second derivative.
  - (c) Use the information in (b) above to give a rough estimate of the error in the calculation you made in (a).
2. Given the values  $f(a)$ ,  $f(a+h)$ ,  $f(a+3h)$  find a second order formula (*i.e.* one with an error of approximately  $Ch^2$ ) for  $f'(a)$ .
3. Do the following questions in the text:

**Section 1.2:** 14, 15, 23

**Section 2.1:** 1, 9

**Section 2.2:** 2, 16

**Section 2.9:** 18