

**ESO 208A; ESO 218**

**Computational methods in engineering**

**Tutorial # 7**

**October 3, 2013**

1. Integrate the following function

$$\int_1^2 \left(x + \frac{1}{x}\right)^2 dx$$

- (a) Use analytical method.
  - (b) Use the trapezoidal method with  $n = 1$ .
  - (c) Use the trapezoidal method with  $n = 2$ .
  - (d) Use (b) and (c) and Richardson's extrapolation formula.
  - (e) Use two point Gauss-Legendre formula.
  - (f) Calculate error for steps (b) to (e).
2. Derive an expression for the second order derivative which is second order accurate. Use backward finite difference.