

**M353 5.1 FD** (S. Zhang) .

1. (5.1:a1) Let  $f(x) = \cos x$ ,  $x_0 = 0.8$ . Approximate  $f'(x_0)$ .
  - (a) Use the central difference with  $h = 0.2$ . Find the error and the error bound.
  - (b) Use the central difference with  $h = 0.1$ . Find the error and the error bound.
  - (c) Use the Richardson extrapolation with the data above. Find the error.
  
2. (5.1:a2) Let  $f(x) = \cos x$ ,  $x_0 = 0.8$ . Approximate  $f''(x_0)$ .
  - (a) Use the central difference with  $h = 0.2$ . Find the error and the error bound.
  - (b) Use the central difference with  $h = 0.1$ . Find the error and the error bound.
  - (c) Use the Richardson extrapolation with the data above. Find the error.