Numerical Methods

Homework #2
EN 530.766

1) Derive and compare the schemes and truncation errors for compact difference scheme for the first derivative that employ (a) i, i+1 and i+2; and (b) i-1, i and i+1
2) Fourier transform (FT)
   a) Derive the Fourier transform for the periodic extensions of the functions shown below and plot the Fourier spectrum (complex conjugate of the complex amplitude for each wave number) versus wavenumber on a log-log plot.
   b) Truncate the Fourier modes beyond
      a. k=8
      b. k=16
      c. k=32

      and calculate the inverse FT from this truncated series. Compare the original function and the inverse transform from the truncated series. You might find it useful to plot the difference between the two curves. Comment on this comparison for the various cases.