

# Homework 1

1. Tabulate the values of the symmetric difference approximation to the derivative for the functions  $f = \sin x$  at  $x = 0.1$  and  $f = x^2$  for  $x = 2$  using step sizes  $h = 0.1, 0.01, 0.001, 0.0001$ . You may simply edit the Python program given in class. Compare to the exact derivative and comment.
2. Using the Taylor expansion method develop a numerical approximation for  $\frac{d^2f}{dx^2}$  which is accurate to first order in the step size  $h$ .
3. Solve the equation  $mx = \tanh x$  where  $m = 0.75$ . Quote your answer to 0.01% accuracy.