MATH 284 Mathematical Programming
Homework 7: Due Wednesday April 11 at 1:00pm

Exercises:

1. Consider the function $f(x) = x^3 - e^{0.8x} - 20$. Plot this function to determine the number of solutions to $f(x) = 0$. Then, use the `fzero` function to find numerical solutions to $f(x) = 0$.

2. Determine the three roots of the equation $x^3 - x^2 e^{-0.5x} - 3x = -1$ using MATLAB.

3. Use MATLAB to plot the function

$$f(x) = \frac{2 + (x - 1.45)^2}{3 + 3.5(0.8x^2 - 0.6x + 2)}$$

   and determine an interval(s) over which f has local minima/maxima. Then, using MATLAB's built-in function `fminbnd`, determine the minimum and the maximum of the function.

4. Use the MATLAB function `quadl` to calculate the following integrals numerically:

   (a) $\int_1^{11} \frac{x^3 e^{-0.2x}}{1+x^2}\, dx$

   (b) $\int_2^7 \frac{4x+3\cos(4x)}{2+\sin(x)}\, dx$

   (c) $\int_0^3 \sqrt{1 + 0.5x^3 - x^2}\, dx$

   (d) $\int_0^8 \frac{2x^2+x\cos(x)}{e^x}\, dx$