MECH 105: Homework 8

Note: each part is the same amount of points as a single homework assignment.

Part 1

Develop a function named `falsePosition.m` which estimates the root of a given funtion. Your function should have the following:

Inputs:

- func - the function being evaluated
- x_l - the lower guess
- x_u - the upper guess
- es - the desired relative error (should default to 0.0001%)
- p1,p2,... - any additional parameters used by the function

Outputs:

- root - the estimated root location
- fx - the function evaluated at the root location
- ea - the approximate relative error (%)
- iter - how many iterations were performed

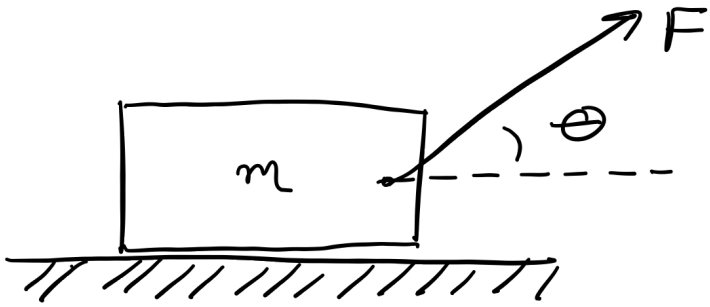
Unlike the bisection function, your user does not have to specify the maximum number of iterations. Default to 200.

Note: you will also need to develop another funciton called `bisect.m`. You CAN copy from Figure 5.7 in your book but don't copy it blindly. If you make that function first, it will likely help you with Part 1 of this assignment.

Part 2

Consider a box of mass $m = 25kg$ being pulled by a rope. The force required to move is given by:

$$F = \frac{\mu mg}{cos\theta + \mu sin\theta}$$



Let:

- $\mu = 0.55$
- $g = 9.81 m/s^2$

Create a MATLAB script that solves for θ if $F = 150N$. Your script should create a plot of a function that is dependent on θ. Use both `falsePosition` and `bisect` functions in your script file. Finally, your script should include a pair of `fprintf` statement(s). Each should comment on the value selected as the root, how many iterations the method took, what the approximate error is and what f is evaluated at the root. You need a `fprintf` statement(s) for each function. Finally, when you run each function, use the default values of the function when you can.

Note: You should change the `format` to `long` early in your script.