1. Consider the function f(x) = x2(x − 1) and use bisection with the following starting intervals.

(a) (a,b)=(0.5,2)

(b) (a,b)=(−1,0.5)

(c) (a,b)=(−1,2)

What happens for each choice of interval? If the method is not successful, explain why. Is it possible for bisection to find the root x = 0?

Ans:

Interval (a) will make the algorithm converge towards the the root at x = 1, since f(0.5) and f(2) have different signs.

Interval (b) will imidietly return an error messagefrom the lines  
**if** (fa\*fb>0):

ier = 1

astar = a

**return** [astar, ier]

Intervall (c) includes two roots, at x = 0 and x = 1. It will do the first iteration of the bisection in the for loop (different signs) and find a new interval (0.5,2) which then gives the same result as (a).

The bisection algorithm can for the root at (0,0) if x = 0 is and end point for the interval.

2. Apply bisection to some functions listed below. You should set your desired accuracy to ε =10^-5

(a) f(x)=(x−1)(x−3)(x−5)witha=0andb=2.4.

(b) f(x)=(x−1)2(x−3)witha=0andb=2.

(c) f(x) = sin(x) with a = 0, b = 0.1. What about a = 0.5 and b = 3π 4

Is the behavior what you expect? Was your code successful? Did it achieve at least the desired accuracy?