Math 373 Assignment 1 (Due Thursday, September 11.)

Page 14: 1b (just for [1,2]), 4a, 9a,b

Page 51: 10a, 14 (For problem 14, you can find the approximation to the root by doing the computations with a calculator, or use the *Matlab* program given below – see also the file `bisection.m` on my Math 373 web site.)

Page 71: 11a Write *Matlab* programs for the three methods based on the model program given below. Print out the approximation given after each iteration and the total number of iterations required by each method. Note that for these methods, we will assume we have satisfied the given accuracy requirement if two successive iterates agree to the given error tolerance, i.e., $|x_{n+1} - x_n| \leq 10^{-5}$.

```
% Bisection
% a = left end point of interval containing the root
% b = right  end point of interval containing the root
% tolx = error tolerance in x
% tolf = error tolerance in the function value
% N = the current iteration number
% Nmax = maximum number of iterations
% fcn.m is the name of the file containing the function
format long
a=1;
b=4;
N=1;
Nmax = 50;
tolx = .001;
tolf = 0.000001;
fa = feval('fcn',a);
fb = feval('fcn',b);
m =(a+b)/2;
fm = feval('fcn',m);
while (abs(b-a) > tolx) & (abs(fm) > tolf) & (N < Nmax)
[N,a,b,m,fm]
 if fa*fm <=0;
  b = m;
  fb = fm;
 else a = m;
 fa= fm;
end
 m = (a+b)/2;
 fm = feval('fcn', m);
 N= N+1;
end
```

To use this program, first create a *Matlab m-file* with the name `fcn.m`. Note that such a file must have the extension *.m* and must be placed in the directory from which you are running *Matlab*. For example, for the function $f(x) = x - \cos x$, the contents of the file `fcn.m` would be:

```
function f = fcn(x)
f = x - cos(x);
```