

Math 373 Assignment 2 (Due Thursday, September 18.)

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Problem 2: The iteration $x_{n+1} = 2 - (1+c)x_n + cx_n^3$ will converge to $s = 1$ for some values of c (provided x_0 is chosen sufficiently close to s). Find the values of c for which this is true. For what values of c will the convergence be quadratic?

Problem 3: Write a Matlab code for Newton's method to find a (non-zero) root of the system

$$x - x^2 - y^2 = 0, \quad y - x^2 + y^2 = 0$$

starting with $x_0 = 0.5$, $y_0 = 0.5$. Use `format long` and stop when both components of two successive iterates agree to 14 decimal places. Display the approximations given and the size of the functions at each iteration.

Problem 4: Solve the same problem using *Matlab's* **fsolve** routine.

To run this program, type

```
options = optimset('Display', 'iter');  
x0 = [0.5,0.5]  
[x,fval] = fsolve(@fcns,x0,options)
```

where `fcns` is the name of the M-file defining the functions. Note that *Matlab* expects the functions to be defined as a vector. See the *Matlab* help page and the file on my webpage called `matlab-commands.html` for further instructions.