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Math128A: Numerical Analysis

Programming Assignment #1, Due 2/28/2012

Consider the cubic equation

$$ax^3 + bx^2 + cx + d = 0, \tag{1}$$

where a , b , c , and d are real input coefficients. Develop a matlab program to find *all* roots of equation (1) using the methods discussed in class. Your program **can not** use the matlab built-in functions `fzero` and `roots`.

You should turn in a .m file `cubicxxx.m` which contains a matlab function of the form

```
function [rts,info] = cubicxxx(a,b,c,d)
```

where `xxx` is your student id, `rts` is the vector of roots and `info` is your output message.

Your program will be stress-tested against cubic equations that may have

1. (40 points) random roots; or
2. (20 points) very large or very small roots; or
3. (20 points) multiple roots or nearly multiple roots; or
4. (20 points) less than 3 roots or more than 3 roots.

You will receive credit for a test polynomial only if your program gets the number of roots correctly, and only then will each correct root (accurate to within a relative error of at most 10^{-10} , as compared to the `roots` function in matlab) receive additional credit.

Your program will receive 0 points if the strings `fzero` or `roots` (both in lower case letters) show up anywhere in your .m file.

Email your .m file to your GSI by 11:59PM, Feb. 28, 2012.