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Math128A: Numerical Analysis

Programming Assignment #1 Due Sept. 27, 2017

Consider the quartic equation

$$x^4 + ax^3 + bx^2 + cx - 1 = 0, \quad (1)$$

where a , b , and c 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`, `roots`, `eig`, and `eigs`.

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

```
function [rts] = quarticxxx(C)
```

where `xxx` is your student id, $C = (a, b, c)$ is the input vector of coefficients, and `rts` is the vector of roots;

Your program will be stress-tested against typical and pathological quartic equations:

1. (40 points) equations with random C ;
2. (30 points) equations with very large C ; or
3. (30 points) equations with double roots or nearly double roots; or

You will receive partial credit for each correct root (accurate to within a relative error of at most 10^{-5} , as compared to the `roots` function in matlab) receive additional credit.

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

Email your .m file to your GSI by 11:59PM, Sept. 27, 2017.