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Math128A: Numerical Analysis

Programming Assignment #1
Due Feb. 22, 2017

Consider the quartic equation

$$x^4 + ax^3 + bx^2 + cx - 1 = 0, \tag{1}$$

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, Feb. 22, 2017.