



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Alastair C. Macmillan	Project Number J1416
Project Title Solving Polynomials: A Multifaceted Approach by Computer	
Abstract Objectives/Goals The purpose of my experiment was to create a computer program that uses various processes for solving the roots of first through fifth order polynomials. The results are limited to real numbers rounded to three decimal places. Methods/Materials I started by looking into ways of solving polynomials, and the method used differed for each order. I found formulas in a number of locations, such as an Algebra 2 text and others on websites. I then worked out how they functioned, and developed flowcharts to model step-by-step instructions of how to solve the polynomial equations. From there I created subroutines that solved each section of the flowchart and combined them to create the program #solving polynomials.sb# that solves for the roots of the polynomials and graphs the results. I needed to test my program out to make sure it worked for all the equations within my parameters. I was able to create control graphs using Grapher, an Apple program, and also used www.solvemymath.com to generate polynomials from the roots given. With these two controls, I was able to check my answers against known results. Results My program successfully solves first through fifth order polynomials with integer coefficients, gives real numbers and also produces graphs of the equation. If non-integer coefficients are entered, the program also uses the bracket method to generate roots to three decimal places. Conclusions/Discussion The #Solving Polynomials.sb# program is unique in that it can successfully solve almost all quintic and lower polynomial equations except ones containing imaginary numbers as roots, and roots that are less than 240 and greater than -240. It could be used to generate quick solutions to engineering problems, like space flight and modeling geometric solids in a variety of situations.	
Summary Statement My project a computer program that uses various processes for solving the roots of first through fifth order polynomials.	
Help Received I used my Dad as a beta tester. Mom helped glue up the board.	