Assignment 5 Description:

This assignment will solve the following problem:

Given two polynomials P and Q of size n, each represented as an array of doubles where P[i] is the coefficient of x to the power i in polynomial P.  
Return an array of size 2\*n which contains the coefficients of the polynomial that is the product of P and Q

Implement the school-book algorithm using two nested for loops polynomial multiplication algorithm. Check it works by running it on a few simple problems that you can do by hand.

Implement the divide and conquer four-subproblem algorithm that we went over in class. Check it works by generating some random problems of size n, where n is a power of 2, solving the problem by using both algorithms and checking that they both return the same answer.

Then perform an empirical study for a large set of random problems. For each problem, a polynomial will be a one-dimensional array of n random doubles within the range of -1.0 to +1.0. Your study will loop from n = 32 to as large as possible, doubling the problem size each time (so n is always a power of 2). For each problem size, generate a set of ten random problems of size n, and measure the time each algorithm takes to solve all problems.

Generate a single log/log graph where x is the problem size and y is the time to solve the problem set.  
Your graphs should be clearly captioned with the axis labeled.