1. Program the simple $O(n^2)$ algorithm and the other $O(n^{\log_2 3})$ divide-and-conquer algorithm for multiplying two polynomials of degree $n - 1$. For the input, use random integers as the coefficients of the two polynomials. Compare the observed running times of the two algorithms as you increase $n$.

2. Program the simple $O(n^2)$ algorithm and the divide-and-conquer $O(n \log^2 n)$ (or $O(n \log n)$) for computing the closest pair of a set of $n$ points in the plane. For the input, use random integers for the coordinates of the points. Compare the observed running times of the two algorithms as you increase $n$.

What you should submit is a nice report that summarizes your observations. Don’t submit your source code unless you are asked to. I suggest increasing $n$ to about $10^4$ or $10^5$, assuming the programs finish in reasonable time for such input sizes. Use your favorite programming language and environment.