Problem 1: For each positive integer $n$, let $C_n$ be the number of different ways to parenthesize a product
\[ x_1 x_2 x_3 \cdots x_{n-1} x_n \]
of $n$ terms so that just two terms are multiplied at a time.
(a) In class we showed that $C_5 = 14$. List the 14 different ways that $x_1 x_2 x_3 x_4 x_5$ can be parenthesized.
(b) Use the recursion formula
\[ C_n = C_1 C_{n-1} + C_2 C_{n-2} + C_3 C_{n-3} + \cdots + C_{n-1} C_1, \]
which we discussed in class, to determine the value of $C_{10}$.
(c) What is the smallest value of $n$ for which $C_n$ exceeds 1 million?

Problem 2: Work problems 2, 4, 6, 8, 12 and 18 on page 85 of the textbook.