Directions: Solve the following problems. All written work must be your own. See the course syllabus for detailed rules.

1. How many circular arrangements of $\{1, \ldots, 2n\}$ do not place two even numbers consecutively?
2. [4.2.7] You want to write down a 3×4 matrix whose entries are either 0 or 1. You want the matrix to have 2 or 3 ones (and the rest zeros). How many such matrices are there?
3. [4.2.10] A class of 32 students is asked to split into lab groups. If there are 10 groups of 3 students and one group of 2 students, how many ways can the groups be formed?
4. [4.2.22] In a letter dated Nov 22, 1693, Samuel Pepys asked Isaac Newton a probability question. He posed three scenarios and wanted to know which one had the greatest chance of success. The scenarios were: throwing six dice in hopes of obtaining at least one 6; throwing 12 dice in hopes of obtaining at least two 6's; and throwing 18 dice in hopes of obtaining at least three 6's. Calculate the probability of success in each of these cases.
5. Two fours.
   (a) In terms of n, what is the probability that a number selected from $\{1, \ldots, 10^n\}$ contains exactly two digits equal to 4?
   (b) Which value(s) of n maximize the probability of finding exactly two digits equal to 4?
6. How many ways are there to arrange the letters of MISSISSIPPI:
   (a) with no additional restrictions?
   (b) [4.3.7] if all four S's cannot appear consecutively?
   (c) if no two S's can appear consecutively?