(*): Assigned to weekly problem set.

Counting

1. How many ways are there to permute the letters in the word 'MOOSALAMOO'?

2. A box contains 24 light bulbs of which four are defective. Suppose that one person selects 10 bulbs from the box randomly without replacement, and then a second person takes the remaining 14 bulbs. How many ways are there for all four defective bulbs to be obtained by the same person?

Naive Definition of Probability

1. Suppose there are thirty possible questions on an exam (the horror!), where each question corresponds to one topic in the course. Students may choose between the following two options of exams:

   i. The professor randomly chooses three questions, and the student must answer two of them, or

   ii. The professor randomly chooses five questions, and the student must answer three of them.

   Students passes the exam if they answer all of their selected questions correctly, and fail otherwise. A (nameless) student only knows 18 topics. Which option is better for the student?

2. A standard deck of cards is shuffled well. The cards are dealt one by one, until the first time an ace appears.

   (a) (*) What is the probability that *no* kings, queens, nor jacks appear before the first ace?

   (b) What is the probability that *exactly one* king, *one* queen, and *one* jack (in any order) appear before the first ace?

   Your solution should be presented in closed-form (summation notation) and, if possible, in terms of decimal points.