

TRINITY COLLEGE DUBLIN
School of Computer Science and Statistics

Week 1 Questions

ST3009: Statistical Methods for Computer Science

For each problem, explain/justify how you obtained your answer in order to obtain full credit. In fact, most of the credit for each problem will be given for the derivation/model used as opposed to the final answer.

Question 1. A substitution cypher is derived from orderings of the first 10 letters of the alphabet. How many ways can the 10 letters be ordered if each letter appears exactly once and: (a) There are no other restrictions?

(b) The letters E and F must be next to each other (but in any order)?

(c) How many different letter arrangements can be formed from the letters BANANA ?

(d) How many different letter arrangements can be formed by drawing 3 letters from ABCDE ?

Question 2. A 6-sided die is rolled four times.

(a) How many outcome sequences are possible, where we say, for instance, that the outcome is 3, 4, 3, 1 if the first roll landed on 3, the second on 4, the third on 3, and the fourth on 1?

(b) How many of the possible outcome sequences contain exactly two 3's ?

(c) How many contain at least two 3's ?

Question 3. You are counting cards in a card game that uses two decks of cards. Each deck has 4 cards (the ace from each of 4 suits), so there are 8 cards total. Cards are only distinguishable based on their suit, not which deck they came from.

(a) In how many distinct ways can the 8 cards be ordered?

(b) You are dealt two cards. How many distinct pairs of cards can you be dealt? Note: the order of the two cards you are dealt does not matter.

(c) You are dealt two cards. Cards with suits hearts and diamonds are considered "good" cards. How many ways can you get two "good" cards? Order does not matter.