UNIVERSITY OF GHANA

COLLEGE OF BASIC AND APPLIED SCIENCE

SCHOOL OF ENGINEERING SCIENCES

FAEN 302: STATISTICS FOR ENGINEERS

ASSIGNMENT 1

Deadline for submission – 8th October, 2021

1. Suppose we have 3 cards identical in form except that both sides of the first card are coloured red, both sides of the second card are coloured black, and one side of the third card is coloured red and the other side is coloured black. The 3 cards are mixed up in a hat, and 1 card is randomly selected and put down on the ground. If the upper side of the chosen card is coloured red, what is the probability that the other side is coloured black?

2. Suppose a license plate must consist of 7 numbers or letters. How many license plates can be formed if
   a. there can only be letters?
   b. the first three places are numbers and the last four are letters?
   c. the first three places are numbers and the last four are letters, but there cannot be any repetitions in the same license plate

3. It is estimated that 50% of emails are spam emails. Some software has been applied to filter these spam emails before they reach your inbox. A certain brand of software claims that it can detect 99% of spam emails, and the probability for a false positive (a non-spam email detected as spam) is 5%. Now if an email is detected as spam, then what is the probability that it is in fact a non-spam email

4. Suppose we have 4 Americans and 6 Canadians.

   a) How many ways can we arrange them in a line?
   b) How many ways if all the Americans have to stand together?
   c) How many ways if not all the Americans are together?
   d) Suppose you want to choose a committee of 3, which will be all Americans or all Canadians. How many ways can this be done?
   e) How many ways for a committee of 3 that is not all Americans or all Canadians?

5.

a. How many ways can one arrange 5 math books, 6 chemistry books, 7 physics books, and 8 biology books on a bookshelf so that all the math books are together, all the chemistry books are together, and all the physics books are together.

b. How many different strings can be made by reordering the letters a, a, b, b, c, c?

6. In a class of a certain school, 20 of the students study French, 12 study Geography, and 9 study History. 12 students study only French, 4 study only History and 5 study only Geography. Every student studies at least one of the three subjects but no student studies all three.

   a) How many students are there in the class?
   b) If a student is selected at random from the class, find the probability that the person chosen studies
      i. both History and Geography
      ii. exactly two subjects
   c) If a student is selected at random from the list of all those who do not study French, find the probability that the person chosen studies
      i. both History and Geography
      ii. only Geography