**NATIONAL UNIVERSITY OF SINGAPORE**

**Department of Statistics and Applied Probability**

**(2018/19) Semester 1 ST2334 Probability and Statistics Tutorial 2**

1. The probability that a Singapore company will set up a factory in Shandong is 0.7. The probability that it will set up a factory in Jiangsu is 0.4 and the probability that it will set up in either Shandong or Jiangsu or both is 0.8. What is the probability that the company will set up a factory.
2. in both provinces?
3. in neither province?
4. p111 Q3.70 McClaveSuppose there are 500 applicants for five equivalent positions at a factory and the company is able to narrow the field to 30 equally qualified applicants. Seven of the finalists are minority candidates. Assume that the five who are chosen are selected at random from this final group of thirty.
   1. In how many ways can the selection be made?
   2. What is the probability that none of the minority candidates is hired?
   3. What is the probability that no more than one minority candidates is hired?

Ans : 142506; 0.236; 0.671

3.50p106McClave

1. Consider 5-card poker hands dealt from a standard 52 card deck. Two important events are

*A* = {You draw a flush (5 cards from the same suit)}

*B* = {You draw a straight (values of the 5 cards are in sequence, e.g., 9 of diamonds, 10 of hearts, jack of hearts, queen of spades and king of spades)}

Assuming that aces can be high or low, if you are dealt a 5-card hand, what is the probability

1. ?
2. ?
3. The route by a certain motorist in commuting to work contains two intersections with traffic lights. The probability that he must stop at the first light is 0.4, the probability that he stops at the second light is 0.5, and the probability that he must stop at least one of the two lights is 0.6. What is the probability that he must stop
4. at both lights?
5. at exactly one light?
6. at neither light?
7. at the second light given that he has stopped at the first light?
8. Consider 9-digit numbers where each digit is one of the 10 integers 0, 1, ⋯, 9.
9. What is the probability that no two consecutive digits are the same in a randomly selected 9-digit number?
10. What is the probability that 0 appears as a digit for a total of 3 times in a randomly selected 9-digit number?
11. Mendenhall Beaver & Beaver 14th ed P4.68 p152Player A has entered a golf tournament but it is not certain whether B will enter. Player A has probability 1/6 of winning the tournament if player B enters and probability 3/4 of winning if player B does not enter the tournament. If the probability that player B enters is 1/3, find the probability that player A wins the tournament.
12. Levine et al p182 P4.45 A soft-drink bottling company maintains records concerning the number of unacceptable bottles of soft drink obtained from the filling and capping machines. Based on the past data, the probability that a bottle came from machine I and was nonconforming is 0.01 and the probability that a bottle came from machine II and was nonconforming is 0.025. Half the bottles are filled on machine I and the other half are filled on machine II. If a filled bottle of soft drink is selected at random, what is the probability that
13. it is a nonconforming bottle?
14. it was filled on machine II?
15. it was filled on machine II and is a conforming bottle?
16. it was filled on machine I or is a conforming bottle?
17. Suppose you know that the bottle was produced on machine I. What is the probability that it is nonconforming?
18. Suppose you know that the bottle is nonconforming. What is the probability that it was produced on machine I?
19. Explain the difference in the answers to (e) and (f).

%3.63/p109 McClave

1. 75% of all women who submit to pregnancy tests are really pregnant. A certain pregnancy test gives a false positive result with probability 0.02 and a valid positive result with probability 0.99. If a particular woman's test is positive, what is the probability that she is really pregnant?
2. Let *A* and *B* be two events such that Pr(*A* ∩ *B*) = 0.8 and Pr(*A*) = 0.4.
   1. If *A* and *B* are mutually exclusive, find Pr(*B*).
   2. If *A* and *B* are independent, find Pr(*B* | *A*).

**Answers to selected problems:**

1. *A* = {Shandong}, *B* = {Jiangsu}. (a) . (b) .

2. (a) . (b) . (c) .

3. (a) . (b) .

4. = {Stop at Light *i*}. (a) . (b) . (c) . (d) .

5. (a) . (b) .

6. .

7. = {Filled on Machine }, = {Non-conforming}. (a) . (b) . (c) . (d) . (e) . (f) .

8. *P* = {Pregnant}, *T* = {Test +}. .