Third Homework for 101 stat

(2+2+2 marks)

1) Answer the following questions:

a) How many ways can you arrange 4 out of 7 books on a shelf?

b) How many possible different hands of 5 cards each can be dealt from a standard deck of 52 cards?

c) If an automobile license plate must consist three letters (English letters) followed by three single-digit numbers, how many different license plates are possible?

(a6+b2 marks)

2) In a hospital, there are 12 nurses and 4 doctors. Then:

a) If a committee of 4 nurses and 2 doctors is to be chosen. How many different possibilities are there?

b) If a committee contains 6 persons, what is the probability that two doctors in this committee?

3) If we have Ω a space of elementary evens, A, B and $C \in 2^{\Omega}$ with $P(A \setminus B) = 0.15$, $P(B \setminus A) = 0.30$, $P(C \setminus A) = 0.35$ and $P(A \cap B) = 0.10$, $P(A \cap C) = 0.15$, $P(B \cap C) = 0.20$ and $P(A \cap B \cap C) = 0.05$. Then:

a) Calculate the following probabilities:

(2×8 marks)

$$P(A) \quad P(A \setminus C) \quad P(B) \quad P(C \setminus B) \quad P(C) \quad P(B \setminus C) \quad P(A \mid B) \quad P(A \mid B \cap C)$$

b) If you know that:

(2×3 marks)

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(-B \cap C) + P(A \cap B \cap C)$$

Then calculate the probabilities: $P(A \cup B \cup C)$ $P(\bar{A} \cap \bar{B} \cap \bar{C})$ $P(A \mid B \cap C)$

c) Are the events A, B and C independent?

(4 marks)

4) A factory has two machines M_1, M_2, M_3 and M_4. If these machines produce 15%, 20%, 25% and 40% of the items respectively. The defective items from these machines are 1%, 2%, 3% and 4% respectively. If an item selected at random, then:

a) Calculate the probability that the selected item is not defective.   (2+2 marks)

b) If we find that the selected item is defective, what is the probability that this item made in machine Z_4?

(2 marks)

5) There are two traffic lights on the route used by Pikup Andropov to go from home to work. Let E denote the event that Pikup must stop at the first light and F in a similar manner for the second light. Suppose that $P\ E\ = 0.40$, $P\ F\ = 0.30$ and $P(E \cap F) = 0.15$. What is the probability that he:

a) Must stop for at least one light?   (2 marks)

b) Doesn't stop at either light?   (2 marks)

c) Must stop at exactly one light?   (4 marks)

d) Must stop just at the first light?   (2 marks)

6) We suppose that 23% of adult persons in a particular population, smoke cigarettes. It's known that 57% of smokers and 13% of non-smokers develop a certain lung condition by the age of 60. What is the probability that a randomly selected 60-year-old, of that population, has this lung condition?

(14 marks)