HomeWork2

Chapters 3 (Probability)

Q. 1: A message can follow different paths through servers on a network. The senders message can go to one of five servers for the first step, each of them can send to five servers at the second step, each of which can send to four servers at the third step, and then the message goes to the recipients server. (a) How many paths are possible? (b) If all paths are equally likely, what is the probability that a message passes through the first of four servers at the third step?

Q. 2: A manufacturer of front lights for automobiles tests lamps under a high humidity, high temperature environment using intensity and useful life as the responses of interest. A total of 130 lamps were sampled, 117 lamps of them had satisfactory intensity and satisfactory useful life, 120 of the total had satisfactory intensity but 2 of them had neither satisfactory intensity nor satisfactory useful life.

a. Write out the sample space.
b. Find the probability that a randomly selected lamp will yield unsatisfactory results under any criteria.
c. The customers for these lamps demand 95% satisfactory results. Can the lamp manufacturer meet this demand?

Q3: A maintenance firm has gathered the following information regarding the failure mechanisms for air conditioning systems:

Evidence of gas leaks

Evidence of electrical failures	satisfactory	unsatisfactory
satisfactory	55	17
unsatisfactory	32	3

The units without evidence of gas leaks or electrical failure showed other types of failure. If this is a representative sample of AC failure, find the probability:
(a) That failure involves a gas leak;
(b) That there is evidence of electrical failure given that there was a gas leak;
(c) That there is evidence of a gas leak given that there is evidence of electrical failure.

Q4: Samples of laboratory glass are in small, light packaging or heavy, large packaging. Suppose that 2 and 1% of the sample shipped in small and large packages, respectively, break during transit.
It is also known that 60% of the samples are shipped in large packages and 40% are shipped in small packages.
a. Write out the sample space.
b. What proportion of samples break during shipment?
c. If samples shipped through small and light packaging, what is the probability that samples beak during shipment.

Q5: A batch of 25 injection-molded parts contains 5 that have suffered excessive shrinkage.

(a) Write out the sample space
(b) If two parts are selected at random, and without replacement, what is the probability that the second part selected is one with excessive shrinkage?
(c) (b) If three parts are selected at random, and without replacement, what is the probability that the third part selected is one with excessive shrinkage?
(d) If 3 parts are selected, without replacement, what is the probability that only one suffered excessive shrinkage?
(e) How many sample points are in the sample space?

Q6: A batch of 500 containers for frozen orange juice contains 5 that are defective. Two are selected, at random, without replacement, from the batch. Let *A* and *B* denote the events that the first and second container selected is defective, respectively. (a) Are *A* and *B* independent events? (b) If the sampling were done with replacement, would *A* and *B* be independent?

Q7.
A worker has asked her supervisor for a letter of recommendation for a new job. She estimates that there is an 80 percent chance that she will get the job if she receives a strong recommendation, a 40 percent chance if she receives a moderately good recommendation, and a 10 percent chance if she receives a weak recommendation. She further estimates that the probabilities that the recommendation will be strong, moderate, and weak are .7, .2, and .1, respectively. **(a)** How certain is she that she will receive the new job offer? **(b)** Given that she does receive the offer, how likely should she feel that she received a strong recommendation? a moderate recommendation? a weak recommendation? **(c)** Given that she does not receive the job offer, how likely should she feel that she received a strong recommendation? a moderate recommendation? a weak recommendation?