Department of Mathematics and Statistics KFUPM
STAT 319-03, Term 151, Quiz#2, Time: 20 mins

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Q.No.1:- A traffic control engineer reports that 90% of the vehicles passing through the King Fahd causeway are from Saudi Arabia.

a. What is the probability that fewer than 8 of the next 9 vehicles are from Saudi Arabia?

b. If the engineer expects 240 vehicles to pass through, what is the expected number of vehicles from Saudi Arabia?

c. What is the probability that the first vehicle to pass from Saudi Arabia is the third one checked, if the vehicles are checked one by one?

Q.No.2:- A particular industrial product is shipped in the lots of 20. A specific lot contains 4 defective products. The manufacturer selects 5 items from that lot and will reject the lot if more than one defective is observed. What is the probability that the lot will be accepted?

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

$$P(A \cup B) = 1 - P(A \cup B)' = 1 - P(A' \cap B') \quad \text{and} \quad P(A \cap B)' = P(A' \cup B')$$

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}, P(B) \neq 0 \qquad \text{and} \qquad P(A \cap B) = P(A).P(B \mid A) = P(A \mid B).P(B)$$

$$P(B_i \mid A) = \frac{P(A \mid B_i).P(B_i)}{\sum_{i=1}^{k} P(A \mid B_i).P(B_i)}, P(A) \neq 0$$

$$\mu = E(X) = \sum x f(x); \quad E(X^2) = \sum x^2 f(x) \quad \text{and} \quad \sigma^2 = E(X-\mu)^2 = E(X^2) - \mu^2$$

$$f(x) = \frac{1}{n}; \;\; x = x_1, x_2, \dots, x_n; \;\; \mu = \frac{x_n + x_1}{2}; \;\; \sigma^2 = \frac{(x_n - x_1 + 1)^2 - 1}{12}$$

$$f(x) = \binom{n}{x} p^x (1-p)^{n-x}; \;\; x = 0,1,\dots,n; \;\; \mu = np; \;\; \sigma^2 = np(1-p)$$

$$f(x) = p(1-p)^{x-1}; \;\; x = 1,2,\dots\dots; \;\; \mu = 1/p; \;\; \sigma^2 = (1-p)/p^2$$

$$f(x) = \frac{\binom{K}{x}\binom{N-K}{n-x}}{\binom{N}{n}}; \;\; x = \max\{0, n+K-N\} \text{ to } \min\{K, n\}; \; \mu = np; \;\; \sigma^2 = np(1-p)\frac{N-n}{N-1}; \;\; p = \frac{K}{N}$$

$$f(x) = \frac{e^{-\lambda t}(\lambda t)^x}{x!}; \;\; x = 0,1,\dots\dots; \; \mu = \lambda t; \;\; \sigma^2 = \lambda t$$