KFUPM | Term 181 | Date: 14/10/2018
Math & Stat Dept. | STAT 319 | Duration: 40 minutes
Class Test #1

Name: ID#: Section #1 Serial

1. Four identical computers are subjected to excessively hot operating conditions. Based on past experience, there is a 30% chance of failure for any given computer. Find the probability that
   a. At least one fails

   b. The first computer fails is the third one tested.

2. A camcorder manufacturer uses one microchip in assembling each camcorder it produces. The microchips are purchased from suppliers A, B, and C and are randomly picked for assembling each camcorder. Twenty percent of the microchips come from A, 35 percent come from B, and the remainder come from C. Based on past experience, the manufacturer believes that the probability that a microchip from a is defective is 0.03, and the corresponding probabilities for B and c are 0.02 and 0.01, respectively. A Camcorder is selected at random from a day's production, and its microchip is found to be defective. Find the probability that it was supplied from supplier B?

P.T.O. ➔

3. A batch of 30 containers for frozen orange juice contains 4 that are defective. Three are selected, at random, without replacement from the batch
   a. What is the probability that the second one selected is defective given that the first one was defective?

   b. What is the probability that at least two are defectives?

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4. The lifetime X (in hours) of the central processing unit of a certain type of microcomputer is an exponential random variable with parameter 0.001.
   a. What is the probability that the unit will work at least 1,500 hours?

   b. If we randomly selected one unit, what is the lifetime over which 30% of such units fail?

   c. What is the variance of the lifetime of this unit?

With My Best Wishes

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Name: ID#: Section #2 Serial

1. A manufacturing process produces integrated circuit chips. Over the long run the fraction defective chips produced by the process is around 20%. Thoroughly testing a chip to determine whether a chip is good or bad is rather expensive, so an inexpensive test is tried. All good chips will pass the inexpensive test, but so will 10% of the bad chips.
   a. Given that a chip passes the inexpensive test, what is the probability that it is a good chip?

   b. If a company using this manufacturing process sells all chips which pass the inexpensive test, over the long run what percentage of chips sold will be bad?

2. In a food processing plant there are, on average, two packaging breakdowns per week (6 working days).
   a. What is the probability that there are less than three breakdowns in the next two weeks?

   b. What is the probability that there are more than three breakdowns in the next 30 working days?

P.T.O. ➔

3. The lifetimes of the electromagnetic valve used for starting the idle-up actuator of an air conditioner can be modeled by an exponential distribution with a rate of 0.05 failure per million revolutions. Consider a randomly selected electromagnetic valve.
   a. What is the probability that a valve fails within the first half million revolutions?

   b. What is the probability that a valve lasts longer than 3 million revolutions?

   c. What is the expected time to failure for a valve?

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4. The amount of residue from a chemical reaction in grams is modeled by the following cumulative density function $F(x) = \begin{cases} 0 & x < 0 \\ 0.25x & 0 \le x < 4 \\ 0.04x + 0.64 & 4 \le x < 9 \\ 1 & x \ge 9 \end{cases}$
   a. Determine the probability density function of the residue amount in grams.

   b. What is the probability that the residue will exceed 5 gm?

   c. What is the probability that the residue will be between 3 gm and 5 gm?

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