EB 3125 STATISTICS – TEST

Instruction: Answer All Questions.

1. The following data give the average starting teacher salary ($000) of 15 states in US for the years 2012 to 2013.

47.9	65.5	49.9	46.6	69.3	49.8	69.8	59.7
70.9	46.9	52.9	54.3	49.7	59.1	51.5	

Find the median, mean and variance for these data.

(8 MARKS)

2. In a large national population of college students, 42% attend 3–year institution and the rest attend 2–year institution. Males make up 45% of the students in the 3–year institution and 40% of the students in the 2–year institution.

   i. Prepare a tree diagram for this problem and compute the outcomes.

   (6 MARKS)

   ii. Given that a male student is selected from this population. What is the probability that he attends a 2–year institution?

   (4 MARKS)

3. The probability that a patient fails to recover from a particular operation is 0.1. Suppose that eight patients having this operation are selected at random.

   i. What is the probability that at least 2 but no more than 3 patients will not recover?

   (3 MARKS)

   ii. What probability at most one patient will not recover.

   (3 MARKS)

4. A batch of 50 parts contains six defects. If two parts are drawn randomly one at a time with replacement, what is the probability that:

   i. both parts are defective.

   (3 MARKS)

   ii. only one part is defective.

   (3 MARKS)

FORMULAE

UNGROUPED DATA	GROUPED DATA
Mean, $\bar{x} = \dfrac{\sum f}{n}$ Sample Variance, $s^2 = \dfrac{\sum x^2 - \dfrac{\left(\sum x\right)^2}{n}}{n-1}$ Standard deviation, $s = \sqrt{s^2}$	Mean, $\bar{x} = \dfrac{\sum fx}{n}$ Median, MD $= L + \left(\dfrac{\frac{n}{2} - C_f}{f}\right) C$ Sample Variance , $s^2 = \dfrac{\sum X_m{}^2 f - \dfrac{\left(\sum X_m f\right)^2}{n}}{n-1}$ Standard deviation, $s = \sqrt{s^2}$

PROBABILITY	CONDITIONAL PROBABILITY

Complement Rule
$P\left(\bar{A}\right) = 1 - P(A)$
 	
A and B are mutually exclusive events
$P(A \cup B) = P(A) + P(B)$
 	
A and B are mutually non exclusive events
$P\left(A \cup B\right) = P(A) + P(B) - P(A \cap B)$
	P (A | B) = $\dfrac{P\left(A \cap B\right)}{P(B)}$
	
	If A and B are independent, then
	$P(A \cap B) = P(A) \cdot P(B)$
	
	If A and B are dependent, then
	$P(A \cap B) = P(B) \cdot P(B / A)$

BINOMIAL DISTRIBUTION	DISCRETE RANDOM VARIABLE
$P(X = x) = {}^nC_x \, (p)^x \, (q)^{n-x} = \dfrac{n!}{x!(n-x)!} p^x (1-p)^{n-x}$ $\mu = np \, ; \qquad \sigma^2 = np(1-p)$	$E(X) = \mu = \sum X \cdot P(X)$ $V(X) = \sigma^2 = \sum \left[X^2 \cdot P(X)\right] - \mu^2$

STANDARD NORMAL DISTRIBUTION	POISSON DISTRIBUTION
$z = \dfrac{x - \mu}{\sigma}$	P (X = x) = $\dfrac{e^{-\lambda} \lambda^x}{x!}$