

University of Sargodha

BS 3rd Term Examination 2016

Subject: Software Engineering

Paper: Probability & Statistics (Math:2110)

Time Allowed: 2:30 Hours

Maximum Marks: 80

OBJECTIVE PART (Compulsory)

Maximum Marks: 32

Q#1 Answer the following short questions. Each question carries 02 marks. (16*2=32)

- i. Define Statistical Inference.
- ii. State Bayes' Rule.
- iii. Define random variable.
- iv. Write down the expression for the variance of a random variable.
- v. What is mean and variance of the binomial probability distribution?
- vi. Write down the parameters of the normal distribution.
- vii. Stat Central Limit Theorem.
- viii. What is meant by more efficient estimator?
- ix. Define standard error of a point estimate.
- x. Define outlier.
- xi. Define null hypothesis.
- xii. Define type I error.
- xiii. Describe power of a test.
- xiv. Define P-value.
- xv. Define scatter diagram.
- xvi. Define R^2 .

SUBJECTIVE PART

Maximum Marks: 48

Note: Attempt any three questions. All questions carry equal marks.

Q#2 The tensile strength of silicone rubber is thought to be a function of curing temperature. A study was carried out in which samples of twelve specimens of the rubber was prepared using curing temperature of 20°C and 45°C. The data below show the tensile strength values in megapascals.

20°C:	2.07	2.14	2.22	2.03	2.21	2.03
	2.05	2.13	2.09	2.14	2.11	2.02
45°C:	2.52	2.15	2.49	2.03	2.37	2.05
	1.99	2.42	2.08	2.42	2.29	2.01

- i) Compute sample mean tensile strength for both groups.
- ii) Compute sample standard deviation for both data groups.
- iii) Construct box and whisker plot for both groups to discuss main features of data.

- Q#3 a) A random sample of 200 adults are classified below by gender and their level of education attained.

Education	Male	Female
Elementary	38	45
Secondary	28	50
College	22	17

If a person is picked at random from this group, find the probability that

- the person is a male, given that the person has a secondary education;
- the person does not have a college degree, given that the person is a female.

- b) During a laboratory experiment, the average number radioactive particles passing through a counter in 1 millisecond is 4. What is the probability that 6 particles enter the counter in a given millisecond?

- Q#4(a) An electrical firm manufactures light bulbs that have a life, before burn-out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. Find the probability that a bulb burns between 778 and 834 hours.

- b) Assume the sample variances to be continuous measurements. Find the probability that a random sample of 25 observations, from a normal distribution with $\sigma^2 = 6$, will have a sample variance S^2
- greater than 9.1
 - between 3.462 and 10.745.

- Q#5 a) A random sample of 100 recorded deaths in U.S. during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use $\alpha = 0.05$.

- b) A fuel oil company claims that one-fifth of the homes in a certain city are heated by oil. Do we have reason to believe that fewer than one-fifth are heated by oil if, in a random sample of 1000 homes in this city, 136 are heated by oil? $\alpha = 0.05$

- Q#6 a) A study was done to study the effect of ambient temperature 'x' on the electric power consumed by a chemical plant 'y'. Other factors are held constant, and the data were collected from an experimental pilot plant.

y	250	285	320	295	265	298	267	321
x	27	45	72	58	31	60	34	74

Estimate the slope and intercept in a simple linear regression model.

- b) Given the following set of values:

X	78	89	97	69	59	79	68	69
Y	125	137	156	112	107	136	123	108

Find coefficient of correlation r_{xy} .