Unit 3 - Week 1

Course outline

How does an NPTEL online course work?

Practice Assignment

Week 1

- Lecture 1: Descriptive Statistics-I
- Lecture 2: Descriptive Statistics-II
- Lecture 3: Probability and Distribution
- Lecture 4: Random variable and Expectation I
- Lecture 5: Random variable and Expectation II
- Lecture 6: Random variable and Expectation III
- Lecture 7: Random variable and Expectation IV
- Quiz : Assignment 1
- Download Videos
- Weekly Feedback
- Assignment 1 Solution

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

Week 9

Week 10

Week 11

Week 12

Text Transcripts

Assignment 1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

Assignment covers Descriptive Statistics,Probability & Distribution and Random variable and Expectation

1) The electrospinning method is well known technique for preparing the composite fibers using polymer solutions or polymer melts at nano-scale. The prepared electrospun fiber diameter is not always uniformly distributed. The distributions of diameter always lie in a range. The distributions of diameter of one such composite fiber given below: *1 point*

Diameter(nm)	Count
200	1
225	7
240	3
260	5
280	5
300	5
318	6
375	1
400	1
420	3

Calculate mean and median of a fiber diameter distributions:

- 287.51,280
- 300.67,300
- 280.34,270
- 200.12,250

No, the answer is incorrect.
Score: 0
Accepted Answers:
287.51,280

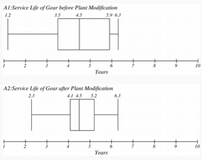
2) Assume that one of the semiconductor labs in MEMS Dept IITB used to manufacture a different kind of semiconductor. One Ph.D. student has prepared some doped semiconductors, and he characterizes the semiconductor by measuring a bulk resistivity. The resistivity measurement is performed using the Four-probe technique and the measurements are: *1 point*
97.118, 97.034, 97.047, 115.05, 97.127, 96.990, 98.001, 99.047, 95.256, 96.225 mΩ-cm

If we remove the extreme point, which conclusions are correct.

- Median will remain almost same.
- Mean will remain same.
- Mean will change significantly.
- Median will change significantly.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Median will remain almost same.
Mean will change significantly.

3) In the figure, A1 shows the service life of some particular type of surface hardens gear, life of such 40 gears recorded to the nearest tenth of a year. In the figure, A2 shows the service life of the same type of gear after certain modification in the existing manufacturing process (A1 and A2 both has the same sample size). Which of the following conclusions are correct? *1 point*



- Performance of service life improve after modification in manufacturing process
- Variation in service life decrease after modification in manufacturing process.
- The minimum service life increased to 2.3 years from 1.2 years
- No improvement in service life

No, the answer is incorrect.
Score: 0
Accepted Answers:
Performance of service life improve after modification in manufacturing process
Variation in service life decrease after modification in manufacturing process.
The minimum service life increased to 2.3 years from 1.2 years

4) The data set is skewed to the right, then: *1 point*

- mode < median < mean
- mode > median > mean
- mean = median = mode
- median < mode < mean

No, the answer is incorrect.
Score: 0
Accepted Answers:
mode < median < mean

5) Let "X" is a random variable with mean μ and standard deviation σ the middle 50% of the value lie in the range of: *1 point*

- inter-quantile range
- $\mu \pm 2\sigma$
- $\mu \pm \sigma$
- $\mu \pm .3\sigma$

No, the answer is incorrect.
Score: 0
Accepted Answers:
inter-quantile range

6) The experimental value of the diffusivity of the silicon in the germanium is given in the table below. Determine the correlation coefficient. *1 point*

$Temperature(^0C)$	$Diffusivity(nm^2/ms)$
550	0.018
600	0.310
650	2.700
700	21.00

(Ref.: H H Silvestri et al 2006 Semicond. Sci. Technol. 21 759)

- 0.837
- 0.926
- 1.0
- -0.837

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.837

7) Consider a binary alloy with N atoms (sites) ($N = N_A + N_B$)which consists of 4 atoms of A (N_A) and 4 atoms of B (N_B). How many ways these atoms can be arranged on the lattice? *1 point*

- 70
- 65
- 73
- 100

No, the answer is incorrect.
Score: 0
Accepted Answers:
70

8) The steel plant produces a steel plate for the automobile industry in a lot size of 10 plates per lot. The quality inspection team randomly checks 3 plates per lot based on the property required for an application and takes a decision to accept or reject a lot. What is the possible random variable? *1 point*

- X(rejected) = 0, X(accepted) = 1
- X(rejected) = yes, X(accepted) = no
- X(rejected) = R, X(accepted) = A
- X(rejected) = 1, X(accepted) = 0

No, the answer is incorrect.
Score: 0
Accepted Answers:
X(rejected) = 0, X(accepted) = 1
X(rejected) = 1, X(accepted) = 0

9) The probability that the random variable X lie in the interval [a,b] is the integral of *1 point*

- Probability density function
- Probability mass function
- Cumulative distribution function
- Poisson distribution

No, the answer is incorrect.
Score: 0
Accepted Answers:
Probability density function

10) The property $\sum_{i=1} f(x_i) = 1$ is satisfy by which of the following probability distribution function: *1 point*

- Probability density function
- Probability mass function
- Cumulative distribution function
- Poisson distribution

No, the answer is incorrect.
Score: 0
Accepted Answers:
Probability mass function

11) The probability distribution function of random variable X which represents defects in steel plate production lot as follows: *1 point*

x	0	1	2	3	4	5	6
f(x)	0.32	0.26	0.15	0.13	0.08	0.05	0.01

Find the first moment of X

- 2.30
- 2.15
- 2.13
- 1.58

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.58

12) Using the data given in question 11, Calculate the second moment of a random variable X. *1 point*

- 4.92
- 4.83
- 4.80
- 4.23

No, the answer is incorrect.
Score: 0
Accepted Answers:
4.92

13) Using the data given in question 11, calculate the variance σ^2. *1 point*

- 3.132
- 2.657
- 2.423
- 2.890

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.423

14) The average strength of a polymer produced is 75 MPa. But the production of polymer is strongly affected by a concentration of the reactant. What is the probability that the mean strength will exceed 85 MPa? *1 point*

- $\frac{20}{17}$
- $\frac{15}{17}$
- $\frac{12}{17}$
- $\frac{16}{17}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{15}{17}$

15) Referring to the question 14, if the variance in the strength of a polymer is 25. What is the probability that the strength of the polymer lie between 65 MPa and 85 MPa ? *1 point*

- 0.50
- 0.20
- 0.35
- 0.75

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.75