

# Unit 8 - Week 6

## Course outline

How does an NPTEL online course work?

### Practice Assignment

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Week 6

Lecture 47: Sampling Distribution I

Lecture 48: Sampling Distribution II

Lecture 49: Sampling Distribution III

Lecture 50: Parameter Estimation I

Lecture 51: Parameter Estimator II

Lecture 52: Parameter Estimator III

Lecture 53: Parameter Estimator IV

Lecture 54: Bayesian Estimation

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Quiz : Assignment 6

Assignment 6 solution

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## Assignment 6

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

**Due on 2020-03-11, 23:59 IST.**

1) An electronics company manufactures some capacitor. Assume that the capacitance follows normal distribution with mean  $100 \mu$  Farad and standard deviation of  $10 \mu$  Farad . If random sample of size 25 is collected from whole lot, what is the probability that average capacitance is less than  $95 \mu$  Farad . **1 point**

- 0.0062  
 0.9952  
 0.0124  
 0.9904

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
0.0062

2) A coffee vending machine dispenses a varying amount of coffee with mean of 100 ml and standard deviation of 10 ml . Suppose you have ordered 50 cup of these coffee, find the mean amount of coffee in each cup and standard deviation of sample mean. Assume that the individual dispenses are independent **1 point**

- 100 & 1  
 100 & 10  
 100 & 1.41  
 Can't not be calculated with this information.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
100 & 1.41

3) Let  $X_1, X_2, X_3, \dots, X_n$  be a sample from a population with mean  $\mu$  and variance  $\sigma^2$  . If the sample variance is  $S^2$  , then the expected value of sample variance  $E[S^2]$  equal to **1 point**

- $\sigma^2$   
  $\sigma^2/n$   
  $\frac{\sigma}{\sqrt{n}}$   
  $\frac{\sigma^2}{n-1}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\sigma^2$

4) Suppose that height of individuals in the population of a particular state in India have mean of 167 cm and the standard deviation of 27 cm . If the 36 individuals are selected randomly, probability that the height will lies in between 163 cm to 170 cm . **1 point**

- 0.8106  
 0.1894  
 0.6259  
 0.8889

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
0.6259

5) The concentration of a reactant influences the strength of the polymer. When the high concentration is used, the strength is 60 MPa, and when low concentration is used, the strength is 55 MPa. The standard deviation of the strength is 4 MPa regardless of concentration. If two random samples of size 16 are taken, find the probability that  $X_{high} - X_{low} \geq 2$ . **1 point**

- 0.8106  
 0.017  
 0.9830  
 0.8889

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
0.9830

6) Let  $X_1, X_2, X_3, \dots, X_n$  be a random sample from normal population with mean  $\mu$  and variance  $\sigma^2$  . Then, sample variance is distributed as **1 point**

- Normal distribution with mean  $\sigma^2$   
 Chi-square distribution with n degrees of freedom  
 Normal distribution with variance  $\sigma^2$   
 Chi-square distribution with n-1 degrees of freedom

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Chi-square distribution with n-1 degrees of freedom

7) Consider n independent Bernoulli trials with probability of success equal to p. What is the maximum likelihood estimator of p. **1 point**

- $\hat{p} = \frac{\sum_{i=1}^n x_i}{n}$   
  $\hat{p} = \frac{\sum_{i=1}^n x_i^2}{n}$   
  $\hat{p} = \frac{\sum_{i=1}^n \sqrt{x_i}}{n}$   
  $\hat{p} = \frac{\sum_{i=1}^n \sqrt{x_i}}{n^2}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\hat{p} = \frac{\sum_{i=1}^n x_i}{n}$

8) The following data of the melting point of lead is calculated using Molecular Dynamics simulation from 24 simulations using different random seed: 330, 322, 345, 328.6, 331, 342, 342.4, 340.4, 329.7, 334, 326.5, 325.8, 337.5, 327.3, 322.6, 341, 340, 333, 343.3, 331, 341, 329.5, 332.3, 340, Assuming that the melting point data follows a normal distribution whose mean as the true melting point of the lead, calculate 95% confidence interval for the melting point data. **1 point**

- 331.22, 336.78  
 331.06, 336.94  
 334, 336  
 329.87, 337.18

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
331.06, 336.94

9) The number of machine failure which results in the breakdown of the production line of the company, for 10 randomly chosen days is as follows: 2, 6, 3, 0, 1, 4, 3, 4, 2, 0 . Estimate the proportion of a breakdown of the production line due to 2 or less machine failure. Assume data follows poisson distribution and maximum likelihood estimator of a Poisson parameter **1 point**

$$\hat{\lambda} = \frac{1}{n} \sum_{i=1}^n X_i$$

- 0.5438  
 0.2154  
 1  
 0.3414

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
0.5438

10) Interval estimator of sample variance from a normal distribution would be based on **1 point**

- Normal distribution  
 t distribution  
 F distribution  
 Chi-square distribution

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Chi-square distribution