

Assignment No. 2

Course Code: ECAP790

Registration Number: 322201297

Instructions:

- Attempt all questions given below in your own handwriting. Assignment in typed format will not be considered for evaluation.
- The student has to complete the assignment in the allocated pages only. Any other page in case utilized shall not be considered.

Q1. Explain concept of Negative Binomial Distribution, Normal Distribution and their properties.

[10 Marks] [CO3, L2]

Negative Binomial Distribution

The Negative Binomial Distribution is a discrete probability distribution that models the number of successes in a sequence of independent and identically distributed Bernoulli trials before a specified number of failure occur. It is characterized by two parameters: the number of failures (r) and the probability of success (p).

Properties of Negative Binomial Distribution:

- Discrete Distribution:** The Negative Binomial Distribution deals with discrete outcomes, specifically the count of successes before a specified number of failures.
- Two parameters:** The distribution is defined by two parameters, the number of failures (r) and the probability of success (p).
- Modeling Successes:** It models the number of successes in a sequence of trials until a specific number of failures occur.
- Versatility:** The Negative Binomial Distribution is versatile and can be applied in various fields, such as economics, biology and quality control.

Normal Distribution

The Normal Distribution, also known as Gaussian Distribution, is a continuous probability distribution that is symmetric and bell-shaped. It is characterized by its mean (μ) and standard deviation (σ) and is widely used in statistical analysis due to its properties.

Properties of Normal Distribution:

- Symmetry:** The Normal Distribution is symmetric around the mean, with data points near the mean being more frequent than those further away.
- Bell Curve:** The distribution forms a bell-shaped curve when plotted, with the mean at the center.
- Mean and Standard Deviation:** The mean determines the center of the distribution, while the standard deviation measures the spread of data around the mean.
- Central Limit Theorem:** The Normal Distribution is central limit theorem, which states that the distribution of sample means approaches a normal distribution as sample size increases.

Signature of the Student

Page 1 of 2

Note:-

CO: is the Course Outcome as per your course syllabus.

L1-L6: Learning level objectives as per Revised Bloom Taxonomy (RBT).

Assignment No. 2

Course Code: ECAP790

Registration Number: 322201297

Instructions:

- Attempt all questions given below in your own handwriting. Assignment in typed format will not be considered for evaluation.
- The student has to complete the assignment in the allocated pages only. Any other page in case utilized shall not be considered.

Q2. Explain control charts for variables – X and R, X and S charts? [10 Marks] [CO2, L2]

Control charts for variables, such as X and R charts and X and S charts, are tools used in statistical process control to monitor and maintain the stability and consistency of a process. These charts help identify variations in the process that may indicate special causes of variation that need to be addressed.

X and R charts (Average and Range charts):

- X chart (Average chart):** The X chart monitors the central tendency of a process by plotting the sample means of subgroups over time. It helps in identifying shifts or trends in the process average.
- R chart (Range chart):** The R chart monitors the dispersion or variability of a process by plotting the ranges of subgroups over time. It helps in identifying changes in process variability.

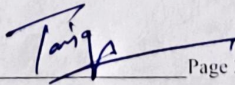
X and S charts (Average and Standard Deviation charts):

- X chart (Average chart):** Similar to the X chart in X and R charts, the X chart in X and S charts monitors the process average by plotting sample means of subgroups over time.
- S chart (Standard Deviation chart):** The S chart monitors the process variability by plotting the standard deviations of subgroups over time. It helps in detecting changes in process dispersion.

Key Points:

- X charts help in monitoring the process average, while R or S charts help in monitoring process variability.
- Control limits are set on these charts to identify when the process is out of control.
- Out of control points on charts indicate the presence of special causes of variation that need investigation and corrective action.

Signature of the Student



Page 2 of 2

Note:-

CO: is the Course Outcome as per your course syllabus.

L1-L6: Learning level objectives as per Revised Bloom Taxonomy (RBT).