Statistics Advance Part 1

Assignment Questions

PW SKILLS

Statistics Advance Part 1

1. What is a random variable in probability theory?
2. What are the types of random variables?
3. What is the difference between discrete and continuous distributions?
4. What are probability distribution functions (PDF)?
5. How do cumulative distribution functions (CDF) differ from probability distribution functions (PDF)?
6. What is a discrete uniform distribution?
7. What are the key properties of a Bernoulli distribution?
8. What is the binomial distribution, and how is it used in probability?
9. What is the Poisson distribution and where is it applied?
10. What is a continuous uniform distribution?
11. What are the characteristics of a normal distribution?
12. What is the standard normal distribution, and why is it important?
13. What is the Central Limit Theorem (CLT), and why is it critical in statistics?
14. How does the Central Limit Theorem relate to the normal distribution?
15. What is the application of Z statistics in hypothesis testing?
16. How do you calculate a Z-score, and what does it represent?
17. What are point estimates and interval estimates in statistics?
18. What is the significance of confidence intervals in statistical analysis?
19. What is the relationship between a Z-score and a confidence interval?
20. How are Z-scores used to compare different distributions?
21. What are the assumptions for applying the Central Limit Theorem?
22. What is the concept of expected value in a probability distribution?
23. How does a probability distribution relate to the expected outcome of a random variable?

Practical

1. Write a Python program to generate a random variable and display its value.
2. Generate a discrete uniform distribution using Python and plot the probability mass function (PMF).
3. Write a Python function to calculate the probability distribution function (PDF) of a Bernoulli distribution.
4. Write a Python script to simulate a binomial distribution with n=10 and p=0.5, then plot its histogram.
5. Create a Poisson distribution and visualize it using Python.
6. Write a Python program to calculate and plot the cumulative distribution function (CDF) of a discrete uniform distribution.
7. Generate a continuous uniform distribution using NumPy and visualize it.
8. Simulate data from a normal distribution and plot its histogram.
9. Write a Python function to calculate Z-scores from a dataset and plot them.
10. Implement the Central Limit Theorem (CLT) using Python for a non-normal distribution.

15. Simulate multiple samples from a normal distribution and verify the Central Limit Theorem.
16. Write a Python function to calculate and plot the standard normal distribution (mean = 0, std = 1).
17. Generate random variables and calculate their corresponding probabilities using the binomial distribution.
18. Write a Python program to calculate the Z-score for a given data point and compare it to a standard normal distribution.
19. Implement hypothesis testing using Z-statistics for a sample dataset.
20. Create a confidence interval for a dataset using Python and interpret the result.
21. Generate data from a normal distribution, then calculate and interpret the confidence interval for its mean.
22. Write a Python script to calculate and visualize the probability density function (PDF) of a normal distribution.
23. Use Python to calculate and interpret the cumulative distribution function (CDF) of a Poisson distribution.
24. Simulate a random variable using a continuous uniform distribution and calculate its expected value.
25. Write a Python program to compare the standard deviations of two datasets and visualize the difference.
26. Calculate the range and interquartile range (IQR) of a dataset generated from a normal distribution.
27. Implement Z-score normalization on a dataset and visualize its transformation.
28. Write a Python function to calculate the skewness and kurtosis of a dataset generated from a normal distribution.