Que1) Plot a histogram, 10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99

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import matplotlib.pyplot as plt
data = [10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99]

# Plotting the histogram
plt.hist(data, bins=10, edgecolor='black')

# Setting labels for the x and y axis
plt.xlabel('Values')
plt.ylabel('Frequency')

# Adding a title for the histogram
plt.title('Histogram of Data')

# Displaying the histogram
plt.show()
```

This will produce a histogram with 10 bins and the x-axis representing the values and the y-axis representing the frequency.

Que2) In a quant test of the CAT Exam, the population standard deviation is known to be 100. A sample of 25 tests taken has a mean of 520. Construct an 80% CI about the mean.

To construct an 80% confidence interval (CI) about the mean, we can use the following formula:

CI = x̄ ± (tα/2 * (s/√n))

Where:

x̄ is the sample mean
tα/2 is the t-value for the desired level of confidence and degrees of freedom (df = n - 1)
s is the sample standard deviation
n is the sample size
Given that the population standard deviation is known to be 100, we can use it as the sample standard deviation for the formula. Also, since we want an 80% CI, we need to find the t-value for the middle 80% of the t-distribution with 24

Using a t-table or a statistical software, we can find that the t-value for the middle 80% of the t-distribution with 24 degrees of freedom is approximately 1.317.

Substituting the given values into the formula, we get:

CI = 520 ± (1.317 * (100/√25))
= 520 ± (1.317 * 20)
= 520 ± 26.34

Therefore, the 80% confidence interval about the mean is (493.66, 546.34).

Que3) A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducted a hypothesis testing surveying 250 residents & found that 170 residents responded yes to owning a vehicle.
a) State the null & alternate hypothesis.
b) At a 10% significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less.

a) The null hypothesis (H0) is that the percentage of citizens in city ABC who own a vehicle is equal to or greater than 60%.
The alternate hypothesis (Ha) is that the percentage of citizens in city ABC who own a vehicle is less than 60%.
Symbolically, we can write:
H0: p >= 0.60
Ha: p < 0.60
where p represents the population proportion of vehicle owners in city ABC.

b) To test the hypothesis, we need to calculate the test statistic and compare it to the critical value. The appropriate test for this scenario is a one-tailed z-test for a proportion.
The formula for the test statistic is:
z = (p̂ - p0) / √(p0 * (1 - p0) / n)
where:
p̂ is the sample proportion of vehicle owners
p0 is the hypothesized population proportion under the null hypothesis
n is the sample size
Substituting the given values, we get:
z = (170/250 - 0.60) / √(0.60 * 0.40 / 250)
= -2.22
Using a z-table or a statistical software, we can find that the critical z-value for a one-tailed test with a 10% significance level is -1.28 (since the alternate hypothesis is one-tailed and is testing for a lower proportion than the hypothesized value).
Since the calculated test statistic (-2.22) is less than the critical z-value (-1.28), we reject the null hypothesis. This means that there is enough evidence to support the idea that the percentage of citizens in city ABC who own a vehicle is less than 60%

Que4) What is the value of the 99 percentile?
2,2,3,4,5,5,5,6,7,8,8,8,8,8,9,9,10,11,11,12

To find the value of the 99th percentile, we need to arrange the given data in ascending order:

2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

The 99th percentile is the value below which 99% of the data falls. To find it, we can use the following formula:

n = (P/100) * N

where:

n is the index of the percentile we want to find
P is the desired percentile (in this case, 99)
N is the total number of observations
Substituting the given values, we get:

n = (99/100) * 20
= 19.8
Since the index must be a whole number, we round up to the next integer to get:
n = 2
Therefore, the 99th percentile is the value at the 20th position in the sorted data:
2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12
The value at the 20th position is 12. Therefore, the value of the 99th percentile is 12.

Que5) In left & right-skewed data, what is the relationship between mean, median & mode?
Draw the graph to represent the same.

In a left-skewed data, the mean is less than the median, which is less than the mode. This means that there are more observations on the left side of the distribution, causing it to skew to the left.
In a right-skewed data, the mean is greater than the median, which is greater than the mode. This means that there are more observations on the right side of the distribution, causing it to skew to the right.
Here is an example of a left-skewed distribution and a right-skewed distribution with their respective mean, median, and mode:

Left-skewed distribution:

```
 ____
/    \
/___
ABC
```

Mean: to the left of B
Median: at B
Mode: to the right of B

Right-skewed distribution:

```
 ___
/
/__
ABC
```

Mean: to the right of B
Median: at B
Mode: to the left of B

In both cases, the median is a better measure of central tendency than the mean because it is less affected by outliers or extreme values in the data. The mode can also be useful in identifying the most frequently occurring value or values in the distr