1. C
2. B
3. A
4. B
5. C
6. C
7. A
8. A
9. C
10. B
11. C
12. B

13th

The test statistic for comparing two samples depends on the specific hypothesis test being conducted. Here are some common methods for comparing two samples:

A. Two-sample t-test: If you want to test whether the means of two populations are equal, you can use a two-sample t-test. The test statistic for this test is:

   $t = (\bar{x}_1 - \bar{x}_2) / (s_1^2/n_1 + s_2^2/n_2)$^(1/2)

   where $\bar{x}_1$ and $\bar{x}_2$ are the sample means, s_1 and s_2 are the sample standard deviations, n_1 and n_2 are the sample sizes, and ^(1/2) denotes the square root.

B. Paired t-test: If you have paired or matched observations, such as before-and-after measurements, you can use a paired t-test. The test statistic for this test is:

   $t = (\bar{x}d - \mu d) / (sd / \sqrt{n})$

   where $\bar{x}d$ is the sample mean of the differences, μd is the hypothesized mean difference, sd is the sample standard deviation of the differences, and n is the sample size.

C. Mann-Whitney U test: If you want to compare the medians of two populations, you can use the Mann-Whitney U test. The test statistic for this test is:

   $U = n_1 n_2 + (n_1(n_1 + 1))/2 - R_1$

   where n_1 and n_2 are the sample sizes, R_1 is the sum of the ranks assigned to the observations in sample 1.

D. Wilcoxon signed-rank test: If you have paired data and want to compare the medians of the differences between the pairs, you can use the Wilcoxon signed-rank test. The test statistic for this test is based on the sum of the signed ranks of the differences.

These are just a few examples of tests that can be used to compare two samples, and there are many other tests that can be used depending on the specific research question and data characteristics.

14th

To find the sample mean difference, you need to have two sets of data that you want to compare. Here are the steps to find the sample mean difference:

a. Take the first set of data and calculate the mean (average) of that set. Let's call this value X1.
b. Take the second set of data and calculate the mean of that set. Let's call this value X2.
c. Calculate the difference between the two means by subtracting X2 from X1. This gives you the sample mean difference.

For example, let's say you have two sets of data:

Set 1: 10, 20, 30, 40, 50

Set 2: 15, 25, 35, 45, 55

To find the sample mean difference between these two sets of data, you would do the following:

i. Calculate the mean of set 1:

   X1 = (10 + 20 + 30 + 40 + 50) / 5 = 30

ii. Calculate the mean of set 2:

   X2 = (15 + 25 + 35 + 45 + 55) / 5 = 35

iii. Calculate the sample mean difference:

   Sample mean difference = X1 - X2 = 30 - 35 = -5

Therefore, the sample mean difference between these two sets of data is -5.

15th

A two-sample t-test is a statistical hypothesis test used to determine whether two independent groups of data have different means. Here's an example:

Suppose you want to compare the average test scores of two different classes of students (Class A and Class B) to determine whether one class performed significantly better than the other. You randomly select 20 students from each class and record their test scores.

Here are the scores:

Class A: 85, 78, 92, 90, 84, 88, 76, 91, 82, 87, 89, 93, 79, 81, 83, 90, 87, 92, 88, 86

Class B: 76, 82, 85, 80, 72, 77, 83, 81, 78, 73, 79, 84, 81, 75, 80, 82, 86, 77, 79, 84

To perform a two-sample t-test, you first calculate the means and standard deviations of the two groups:

Class A: mean = 86.6, standard deviation = 5.81

Class B: mean = 79.2, standard deviation = 4.14

You can see that Class A has a higher mean score than Class B. However, you need to determine whether this difference is statistically significant. You can do this by calculating the t-statistic:

t = (mean(A) - mean(B)) / (sqrt(s^2(A)/n(A) + s^2(B)/n(B)))

where mean(A) and mean(B) are the means of Class A and Class B, s(A) and s(B) are the standard deviations of Class A and Class B, and n(A) and n(B) are the sample sizes.

Plugging in the numbers, we get:

t = (86.6 - 79.2) / (sqrt((5.81^2/20) + (4.14^2/20))) = 3.13

Next, we compare the t-value to a critical value from a t-distribution with (n(A) + n(B) - 2) degrees of freedom at a chosen significance level (e.g., $\alpha = 0.05$). If the calculated t-value is greater than the critical t-value, we reject the null hypothesis that the means are equal and conclude that the two groups have significantly different means.

In this case, the critical t-value is 2.086 at $\alpha = 0.05$ with 38 degrees of freedom. Since our calculated t-value of 3.13 is greater than 2.086, we reject the null hypothesis and conclude that there is a significant difference in test scores between Class A and Class B.