

Student tasks

1. Name one test of correlation.

2. A student obtains a value of 13 when performing a Chi² test. The critical value for their sample size, at a 95% confidence level, is 12. Do they accept or reject their null hypothesis? Explain why.

3. A student proposes the following hypothesis: 'There will be a statistically significant difference between the number of plant species on Beach A and Beach B'. Rewrite this as a null hypothesis.

4. Which test would be appropriate to perform in order to test the hypothesis set in question 3?

5. When performing a Mann-Whitney U test, a student obtains results of 12 and 72 from their two calculations. The critical value for their sample size is 30. What does this tell you about their data?

6. Give two advantages of using a Spearman's rank analysis when analysing data.
 - i.

 - ii.

7. A student wants to see how the number of services in a particular area has changed over time. The student has the results of a previous survey conducted in 1970 and has visited the area to collect data on the current number of different service types. What test should the student use to analyse this data and why?

8. A student has collected the following data. Which test should the student use to analyse the data? Explain why.

| Class | <20 | 20-50 | >50 |
|-------------------|-----|-------|-----|
| Number of pebbles | 16 | 10 | 4 |

9. A student is conducting a Chi² test on the colour of flowers in a particular field and whether there may be something influencing their colour. The student's observed data is given below. Complete the table to calculate the expected frequencies.

| | Observed | Expected |
|-------|----------|----------|
| Red | 8 | |
| Blue | 12 | |
| White | 18 | |
| Green | 2 | |

10. A student calculates the standard deviation of two sets of data for average wages at two companies. The first data set has a mean average of £20,000 and a standard deviation of £4000. The second company has a mean average of £37,000 and a standard deviation of £12,000. What does this tell the student about wages at the two companies?

Suggested answers

1. Name one test of correlation.

Spearman's rank, Student T-test etc.

2. A student obtains a value of 13 when performing a Chi² test. The critical value for their sample size, at a 95% confidence level, is 12. Do they accept or reject their null hypothesis? Explain why.

The student should reject their null hypothesis. As their value of 13 is higher than the critical value of 12, their test has shown a statistically significant difference between observed and expected values. They should therefore reject their null hypothesis and accept their original/alternate hypothesis.

3. A student proposes the following hypothesis: 'There will be a statistically significant difference between the number of plant species on Beach A and Beach B'. Rewrite this as a null hypothesis.

There will be no statistically significant difference between the number of plant species on Beach A and Beach B.

4. Which test would be appropriate to perform in order to test the hypothesis set in question 3?

A Mann-Whitney U test is appropriate, as we are testing the difference between two observed data sets and the data is numerical and not presented in classes.

5. When performing a Mann-Whitney U test, a student obtains results of 12 and 72 from their two calculations. The critical value for their sample size is 30. What does this tell you about their data?

The student should take the smaller of the two values, i.e. 12 and compare this to the critical value of 30. As 12 is smaller than 30, they can accept their hypothesis and reject the null hypothesis. They have shown that there is a statistically significant difference between their two data sets.

6. Give two advantages of using a Spearman's rank analysis when analysing data.

Two from:

- *Allows testing of a relationship between two data sets*
- *Provides a numerical value of correlation*
- *Is non-parametric*
- *Tests both strength and direction of correlation*
- *Can be used with reasonably small data sets (12 or more)*

7. A student wants to see how the number of services in a particular area has changed over time. The student has the results of a previous survey conducted in 1970 and has visited the area to collect data on the current number of different service types. What test should the student use to analyse this data and why?

The student should use a Chi² test, to test current observed values against the expected values of the 1970 survey. The data is recorded in frequency classes; therefore, the Chi² test is appropriate.

11. A student has collected the following data. Which test should the student use to analyse the data? Explain why.

The student should use a Chi² test as the data is in classes/frequencies.

| | | | |
|-------------------|-----|-------|-----|
| Class | <20 | 20-50 | >50 |
| Number of pebbles | 16 | 10 | 4 |

8. A student is conducting a Chi² test on the colour of flowers in a particular field and whether there may be something influencing their colour. The student's observed data is given below. Complete the table to calculate the expected frequencies.

| | Observed | Expected |
|-------|----------|----------|
| Red | 8 | 10 |
| Blue | 12 | 10 |
| White | 18 | 10 |
| Green | 2 | 10 |

9. A student calculates the standard deviation of two sets of data for average wages at two companies. The first data set has a mean average of £20,000 and a standard deviation of £4000. The second company has a mean average of £37,000 and a standard deviation of £12,000. What does this tell the student about wages at the two companies?

The mean wage at Company B is higher, but there is a greater spread of wages paid to the employees there. Sixty-eight percent of employees at Company B earn wages between £25,000 and £49,000, a spread of £24,000; while at Company A sixty-eight percent of employees will be paid a wage between £16,000 and £24,000, a spread of just £8,000 due to the smaller standard deviation of wages at Company A. There is greater wage-equality at Company A, but more high-earners at Company B.