

Revision Exercises

The revision exercises are designed to challenge the reader as to what is the most appropriate exploratory data analysis (EDA) and/or statistical test to employ given the experimental situation presented and, where appropriate, the experimental hypothesis specified. For this reason, no help is given.

It is strongly recommended that an EDA is conducted initially in case any extreme values need to be deselected or the distribution of values makes certain statistical tests unsuitable. If necessary, deselect extreme values before conducting the appropriate statistical test.

The bullet points after each Exercise are provided in case your tutor wants to know what you have done.

Revision Exercise 1

In order to test the hypothesis that, when presented with lists of words, younger children process more information than do older children, a psychologist asked groups of older and younger children to inspect and commit to memory the same list of words and then recall the words in the list. The results were as follows:

Number of words recalled by younger and older children							
Case	Younger	Case	Younger	Case	Older	Case	Older
1	16	6	16	11	12	16	4
2	223	7	21	12	20	17	16
3	20	8	20	13	10	18	9
4	23	9	18	14	13	19	11
5	17	10	20	15	15	20	9

- **Do the data confirm the hypothesis?**
- **Describe how you reached your conclusion.**
- **Name the statistical test and express the result in the usual manner.**

Revision Exercise 2

To test the hypothesis that, in families with two female children, the second-born child is more sociable than the first-born, a researcher selected twenty two-child families. In order to ensure, in each family, the comparability of the social backgrounds of the children, only families with children of Primary School age were selected. The children were tested for sociability, each child receiving a score in the range from 0 (very unsociable) to 10 (very sociable). The scores the children obtained are shown in the table below.

Sociability scores of the first- and second-born children from twenty families					
Family	First-born	Second-born	Family	First-born	Second-born
1	4	7	11	1	5
2	1	5	12	5	8
3	8	6	13	8	9
4	2	4	14	9	9
5	0	2	15	1	4
6	8	8	16	5	7
7	9	8	17	3	4
8	2	7	18	3	6
9	4	6	19	4	5
10	6	8	20	6	7

- **Do the data confirm the hypothesis?**
- **Describe how you reached your conclusion.**
- **Name the statistical test and express the result in the usual manner.**

Revision Exercise 3

A clinician has carried out a study on the efficacy of a type of cognitive therapy, in which the aim is to reduce the number of negative, self-destructive thoughts, as recorded by the patient in a special diary. The Table shows the numbers of negative thoughts recorded by 9 patients over five days, the first two days before therapy and the remaining three days after therapy. The therapy did not begin until the third day, because the therapist wanted to establish a baseline rate with which subsequent frequencies during therapy could be compared.

Numbers of negative thoughts recorded during a course in cognitive therapy					
Patient	First day	Second day	Third day	Fourth day	Fifth day
1	22	22	9	7	6
2	20	20	10	4	4
3	18	15	6	4	5
4	25	30	13	12	16
5	31	26	13	8	6
6	19	27	8	7	4
7	25	16	5	2	5
8	17	18	8	1	5
9	25	24	14	8	10

- **Was the cognitive therapy effective?**
- **Describe how you reached your conclusion.**
- **Name the statistical test and express the result in the usual manner.**
- **A boxplot would show extreme scores for the fifth day. Would you deselect them from the data? Explain your decision.**

Revision Exercise 4

For some years there was, in social psychology in the US, much emphasis upon the advantages of a ‘democratic’, as opposed to an ‘authoritarian’ leadership style in enhancing group performance. It was suspected by some, however, that the efficacy of leadership style might depend upon the nature of the task. Perhaps, for some tasks, an authoritarian (i.e. instructional) style might actually be more effective than a democratic one (i.e. one encouraging questions and discussion)? This is the hypothesis under test.

In a project designed to test the efficacy of leadership style on group performance, groups of soldiers were trained under democratic or authoritarian leadership styles. Later, groups who had been trained under each regime were tested on one of two tasks:

1. A Structured Task, namely, the assembly of a field gun;
2. A Group Problem, in which, given equipment such as barrels and ropes, the group was required to construct a bridge across a fast-flowing river.

On the basis of their performance, each group was awarded a mark on the scale from 1 (low efficacy) to 20 (high efficacy). The results are shown in the Table:

Scores achieved on a criterion group task by twenty soldiers trained under democratic or authoritarian leadership styles		
CriterionTask	Leadership Style	
	Authoritarian	Democratic
Structured Task (Gun Assembly)	13	5
	13	5
	17	8
	15	11
	18	10
Group Problem (Bridge Construction)	9	19
	2	15
	5	18
	12	13
	7	14

- **Is the hypothesis supported?**
- **Describe how you reached your conclusion.**
- **Name the statistical test and express the result in the usual manner.**

Revision Exercise 5

There is a widespread belief (supported by actuarial evidence) that, in tests of decision-making in driving, those between the ages of fifty-five and sixty-five should outperform those in their twenties, despite the inevitable slowing of reaction speed that occurs as a person gets older. To investigate this claim, ten volunteers, five in their twenties and five in their late fifties and early sixties, were recruited to take part in a driving-simulation study.

Driving was assessed under simulated conditions of light and heavy road traffic in both daytime and in night-time illumination. Each driver received a score between 1 (poor) and 100 (excellent) for their performance in each of the four conditions.

The results are shown below:

Performance of drivers in two age groups, driving under simulated conditions of light and heavy traffic, and of daytime and night-time illumination				
Group	Light Traffic		Heavy Traffic	
	Day	Night	Day	Night
Older	74	55	75	15
	72	70	70	10
	70	60	60	10
	68	50	50	10
	66	65	45	5
Younger	40	15	30	30
	25	20	20	20
	30	30	10	10
	25	40	15	15
	10	45	25	25

- **Is the hypothesis supported?**
- **Describe how you reached your conclusion.**
- **Name the statistical test and express the result in the usual manner.**

Revision Exercise 6

A researcher investigated people's ratings of their state of happiness and whether they considered life to be exciting or dull in relation to whether they were white or non-white and whether they were male or female. Is there any evidence of differences among the races and sexes for their ratings of happiness and lifestyle? Is there a relationship between happiness and lifestyle?

The data were as follows:

Number of white and non-white males and females rating themselves for happiness and lifestyle							
		Very Happy		Fairly Happy		Not Very Happy	
Race	Sex	Exciting	Dull	Exciting	Dull	Exciting	Dull
White	Male	84	33	92	129	5	20
White	Female	88	52	96	162	6	44
Non-White	Male	8	4	10	14	7	2
Non-White	Female	10	8	14	36	2	15
TOTAL		190	97	212	341	20	81

- Describe how you reached your conclusions about the researcher's questions.
- Name the statistical tests and express the results in the usual manner.