

EXERCISE 10

One-sample tests

Before you start

Before beginning this Exercise, the reader should study Section 6.5.

The Kolmogorov-Smirnov test for goodness-of-fit

A researcher wishes to ascertain whether response latencies have been drawn from a normal population. The **Kolmogorov-Smirnov test** is an appropriate goodness-of-fit test for this purpose. Table 1 shows the decision-making response latencies of fifty young adults.

910	1013	921	895	879	906	892	902	902	858
874	900	894	872	909	878	935	878	849	969
879	926	877	861	876	906	897	860	887	968
896	905	876	906	928	899	899	899	889	903
977	900	899	892	986	891	881	879	850	874

Name a variable *Latency* and enter the data. Draw a histogram of the distribution, along with a normal curve using **Analyze**→**Descriptive Statistics**→**Frequencies...** to open the **Frequencies** dialog box. Click **Charts...** and select **Histograms**, together with the checkbox **With normal curve**. Return to the **Frequencies** dialog box by clicking **Continue** and ensure that the tick in **Display frequency tables** has been turned off. Finally click **OK**.

- From inspection of the histogram, would you expect the Kolmogorov-Smirnov test to accept or reject the null hypothesis of normality of distribution?
- If the normal curve were a good fit, where would you expect most of the area under the bars to lie?

Run a **Kolmogorov-Smirnov** test for goodness-of-fit on the data in Table 1, as described in Section 6.5.1.

- Write out the result of the Kolmogorov-Smirnov test.
- Is the result what you had expected?

Nominal data: The binomial test

A die is rolled ten times, during which 6 sixes turn up. Have we grounds for suspecting that the die is unfair? Note that the probability of obtaining a six from the roll of a die is $1/6$ (0.17). This is the null hypothesis value to enter as the **Test Proportion** in the **Binomial Test** dialog box (see Section 6.5.2).

Use the procedure described in Section 6.5.2 to enter the data but now define the grouping variable as *Die* with the values *1* for *Six* and *2* for *Not Six*. Remember to apply **Weight Cases...** to the second variable *Freq* and to change the value of **Test Proportion** in the **Binomial Test** dialog box.

- Write out the result of the binomial test.
- Do we have grounds for suspecting that the die is unfair?

Nominal data: The chi-square test for goodness-of-fit

One hundred 5-year-old children are asked which of five toys they prefer. Their choices are as in Table 2.

Toy A	Toy B	Toy C	Toy D	Toy E
40	25	15	15	5

Is there evidence that some toys are preferred to others?

The data are entered as in Section 6.5.2, but with five categories here instead of three. Remember to apply **Weight Cases...** to the second variable *Freq*.

- Write down the result of the chi-square test for goodness-of-fit.
- Referring to this result, write down your answer to the research question. What is the null hypothesis here? What does falsification of the null hypothesis imply?

The one sample *t* test

Table 3 contains the heights of fifty 18-year-old female college students, measured in the year 2000.

Past records, which ended in 1910, showed that over the previous decade, the mean height of women in the same college was 160 cm. No data on spread (or dispersion) are available. Do the present data suggest that women going to this college are taller (or shorter) nowadays?

The directional question of whether today's college women are taller than their predecessors can be approached by making a **One sample *t* test** (see Section 6.5.5) on the data of Table 3. Enter the data into a variable such as *Height*.

162	157	166	157	168	177	168	166	168	166
168	166	161	158	162	167	175	161	171	173
166	178	177	174	178	166	159	175	168	168
166	167	163	173	166	172	166	177	171	168
156	166	165	172	168	162	163	160	169	170

Choose **Analyze** → **Compare Means** → **One-Sample T Test...** to obtain the **One-Sample T Test** dialog box. For the **Test Value**, enter the value *160*. Click **OK** to run the test.

- Write out the result of the one-sample *t* test.
- Does the result of the test indicate that today's college women are taller?

Finishing the session

Close down SPSS and any other windows before logging out of the computer.