

## Chapter 14 / Example 7

# The $t$ -test

**a** In order to test the hypotheses  $H_0: \mu = 8.2$ ,  $H_1: \mu < 8.2$  a sample of 14 is taken and the mean of the sample is found to be 8.15 and the standard deviation 0.07. Test at the 5% significance level whether the sample is from the population given or one with a smaller mean.

**b** The sample below is thought to have come from a normal population with a mean of 34.5. Test this belief at a 5% significance level.

|      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|
| 34.3 | 30.2 | 29.7 | 34.4 | 33.6 | 35.7 | 34.0 | 33.9 | 35.1 | 34.5 |
|------|------|------|------|------|------|------|------|------|------|

$H_0: \mu = 8.2$ ,  $H_1: \mu < 8.2$

To calculate the  $p$ -value Press **MENU** 2 **STAT** to display the List Editor screen.

Press **F3** TEST **F2**  $t$  **F1** 1-SAMPLE

```
1-Sample tTest
Data      :List
μ         :≠μ0
μ0        :0
List      :List1
Freq      :1
Save Res:None
List Var
```

Choose Data: **F2** Var

**F2**  $\mu < \mu_0$

$\mu_0 = 8.2$

$\bar{x} = 995$

$sx = \sqrt{14 \div 13 \times 0.07}$

$n = 14$

Press **EXE**.

```
1-Sample tTest
Data      :Variable
μ         :≠μ0
μ0        :8.2
x̄         :8.15
sx        :0.07264243
n         :14
```

$p$ -value = 0.0115 < 0.05, significant so reject  $H_0: \mu = 8.2$

```
1-Sample tTest
μ         :<8.2
t         :=-2.5753938
p         :=0.01152849
x̄         :8.15
sx        :0.07264243
n         :14
```

Press **EXIT** twice.

Type the values in the first column.

Press **EXE** after each number to move to the next cell.

|                             | List 1 | List 2 | List 3 | List 4 |
|-----------------------------|--------|--------|--------|--------|
| SUB                         |        |        |        |        |
| 1                           | 34.3   |        |        |        |
| 2                           | 30.2   |        |        |        |
| 3                           | 29.7   |        |        |        |
| 4                           | 34.4   |        |        |        |
|                             |        |        |        | 34.4   |
| GRAPH CALC TEST INTR DIST ▶ |        |        |        |        |

$H_0: \mu = 34.5$ ,  $H_1: \mu \neq 34.5$

To calculate the  $p$ -value press **F3** TEST **F2**  $t$  **F1** 1-SAMPLE

```
1-Sample tTest
Data      :Variable
μ         :<μ0
μ0        :8.2
x̄         :8.15
sx        :0.07264243
n         :14
List Var
```

## Chapter 14 / Example 7

# The $t$ -test

Choose Data: **F1** List

**F1**  $\mu \neq \mu_0$

$\mu_0 = 34.5$

List: List1

Freq: 1

Press **EXE**.

1-Sample tTest

Data :List

$\mu$  : $\neq\mu_0$

$\mu_0$  :34.5

List :List1

Freq :1

Save Res:None

**LIST**



$p$ -value = 0.161 > 0.05, not significant so insufficient evidence to reject  $H_0$

1-Sample tTest

$\mu$   $\neq$ 34.5

$t$  =-1.5267401

$p$  =0.1611708

$\bar{x}$  =33.54

$s_x$  =1.98841087

$n$  =10