Chapter 14 / **Example 6**

Two-tailed tests

The times taken by an athlete to run a circuit near his home can be modelled by a normal distribution with a mean of 15.4 minutes and a standard deviation of 0.62 minutes. The athlete's work takes him away from home for six months and on his return he is interested to see whether his average times have changed. He records his times over the first five days after his return and obtains the following times in minutes:

15.4, 15.5, 14.9, 15.2, 15.1

a Use the *p*-value to perform a test at the 5% significance level to see if his average time to complete the circuit has changed.

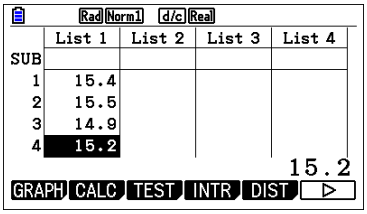
b Find the critical region for the test.

Press MENU 2 STAT to display the List Editor screen.

Type the times in the first column.

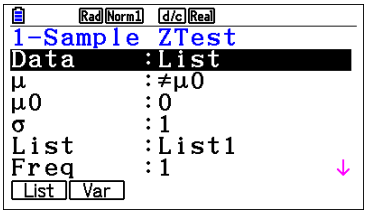
Press EXE after each number to move to the next cell.

Note: *If the list contains other numbers, you can clear it by pressing* F4 DEL-ALL.



H_0: $\mu = 15.4$, H_1: $\mu \neq 15.4$

Press F3 TEST F1 Z F1 1-SAMPLE



Choose Data: F1 List

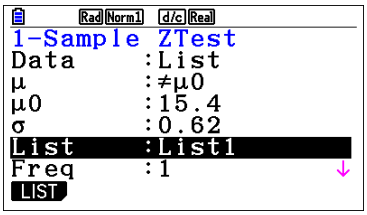
F1 $\mu \neq \mu_0$

$\mu_0 = 15.4$

$\sigma = 0.62$

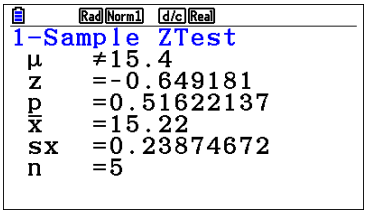
List: List1

Press EXE.



p-value = 0.516

0.516 > 0.05, not significant so no reason to reject H_0 that his average time is still 15.4 minutes.



Chapter 14 / **Example 6**

Two-tailed tests

To find the critical region, $\bar{X} \sim \mathrm{N}\left(15.4, \frac{0.62^2}{5}\right)$

$\mathrm{P}\ a_1 < X < a_2\ = 0.95$

Press EXIT twice.

Press F5 DIST F1 NORM F3 InvN

Select Data F2 Var

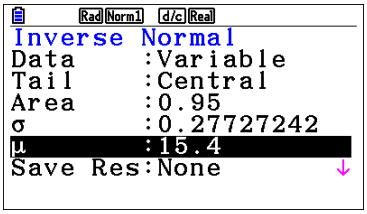
Tail F3 CENTRAL

area = 0.95

$\sigma = 0.62 \div \sqrt{5}$

$\mu = 15.4$

Use ▼ to navigate down to Execute and press EXE.



The critical region is $\bar{X} < 14.86$, $\bar{X} > 15.94$