Chapter 14 / **Example 5**

Testing for the mean of a normal distribution

A machine fills bags of flour with a labelled weight of 1 kg. To make sure the bags are being filled correctly a sample of 40 is taken and their weights measured. The sample mean is found to be 995 g. From past experience it is known that the standard deviation of the bags filled by the machine is 20 g.

a Use the p-value to test whether there is sufficient evidence at the 5% level that the machine is filling the bags to less than the correct weight.

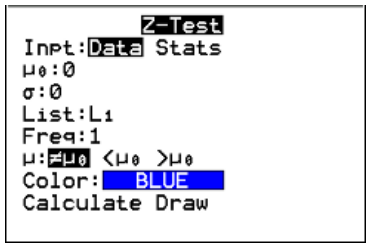
b Find the critical region for the test.

H_0: $\mu = 1000$, H_1: $\mu < 1000$

To calculate the p-value

Press [STAT] and [▶] [▶] to access the TESTS menu.

Select 1:Z-Test… and press [ENTER].



Choose Input: Stats

$\mu_0 = 1000$

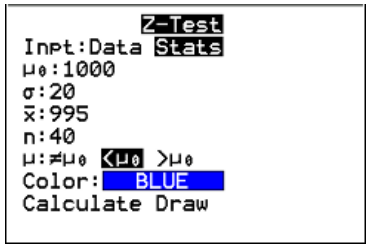
$\sigma = 20$

$\bar{x} = 995$

$n = 40$

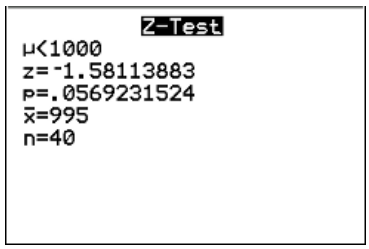
$\mu < \mu_0$

Navigate down to Calculate and press [ENTER].



p-value is $P(\bar{X} < 995) = 0.0569$

0.0569 > 0.05, not significant so insufficient evidence to reject H_0 that the bags are being filled to the correct average weight.

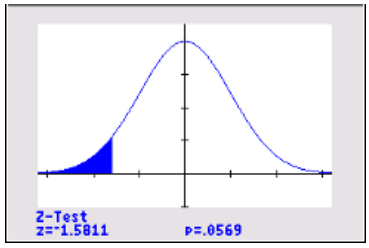


Press [STAT] and [▶] [▶] to access the TESTS menu.

Select 1:Z-Test… and press [ENTER].

Leave all items the same, navigate down to Draw and press [ENTER].

The GDC shows the same information about the p-value with a graph to demonstrate the significance of the value.



Chapter 14 / **Example 5**
Testing for the mean of a normal distribution

To find the critical region, $\bar{X} \sim N\left(1000, \frac{20^2}{40}\right)$

Press 2nd MODE [QUIT]

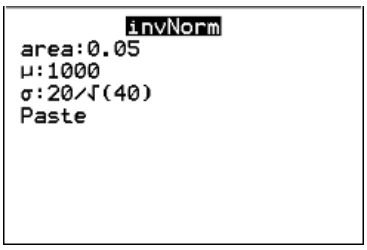
Press 2nd VARS [DISTR] 3:invNorm(

area = 0.05

$\mu = 1000$

$\sigma = 20, \sqrt{40}$

Press ENTER.



Press ENTER.

The critical region is $\bar{X} = 994.8$