EXAMPLE

A tyre company claims that the mean life of tyres that it produces is 11,000 km with a standard deviation of 240 km. An independent supplier of tyres wants to investigate the company's claim. A test on a random sample of 144 tyres from the company gave a mean life of 10,963 km. Carry out a hypothesis test at the 5% level of significance to see if there is evidence to support the company's claim.

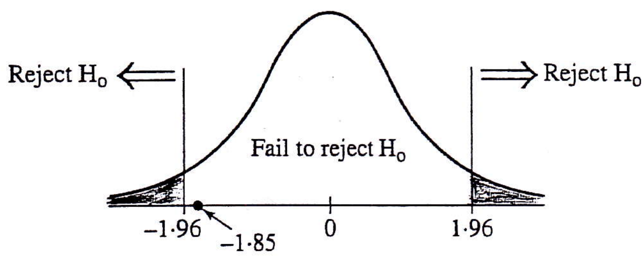
Solution

[Or calculate a confidence interval]

1. State the null and alternative hypotheses.
   Null hypothesis, H_0:
   The company produces tyres with a mean life of 11,000 km. $\mu = 11{,}000$.
   Alternative hypothesis, H_A:
   The company produces tyres whose mean life is not 11,000 km. $\mu \neq 11{,}000$.
2. Convert the given results into z units (the test statistic):

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{10{,}963 - 11{,}000}{\frac{240}{\sqrt{144}}} = -1{\cdot}85$$

3.



We fail to reject H_0, as $-1{\cdot}85$ is not in the critical regions.

4. Hence we fail to reject the company's claim.

In the above example, we used:

H_0: $\mu = 11{,}000$

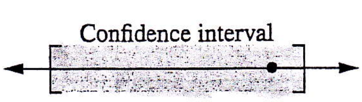
H_A: $\mu \neq 11{,}000$

In these situations, because we do not use $\mu > 11{,}000$ or $\mu < 11{,}000$, no direction is stipulated. Therefore, this is a two-tailed test. (Only two-tailed tests are used on our course.) Also, H_0 always has an equal sign and uses population parameters.

Hypothesis testing – A summary

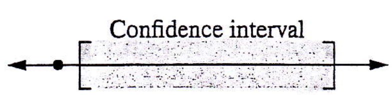
In the final analysis, testing the null hypothesis, H_0 simply involves a confidence interval and a red dot

Either



If the red dot is inside the confidence interval we fail to reject H_0.

Or



If the red dot is outside the confidence interval we reject H_0.

Z scores are called "test statistics"