RECALL

What are the steps in testing hypothesis?

Differentiate the two types of hypotheses.

When is t-test used? Z-test?

HYPOTHESIS TEST FOR THE MEAN

A TEST OF SIGNIFICANCE

TEST OF SIGNIFICANCE

A test of significance in hypothesis testing is used to determine whether **a sample statistic provides enough evidence to reject a null hypothesis about a population parameter.**

EXAMPLE 1

A machine produces screws which have a mean length of 6 cm and a standard deviation of 0.2 cm. The distribution of lengths is assumed to be normal. After the machine was moved, it is believed that the mean length may have changed while the standard deviation stays the same. A sample of 20 screws is measured and found to have the mean length of 5.92 cm. Test, at a 5% significance level, whether there is evidence that the mean length has changed. State the hypotheses and justify your choice of test

EXAMPLE 1: P-VALUE METHOD

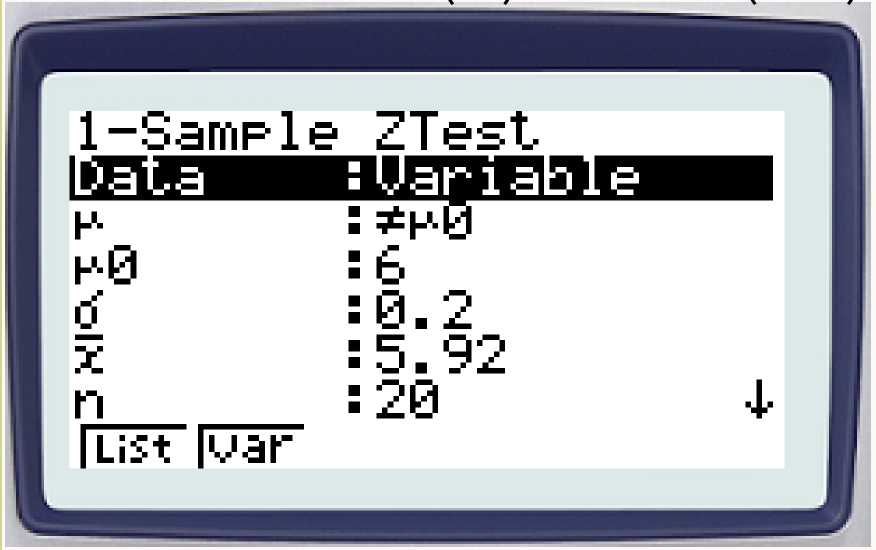
Null: the mean length of the screws is 6cm

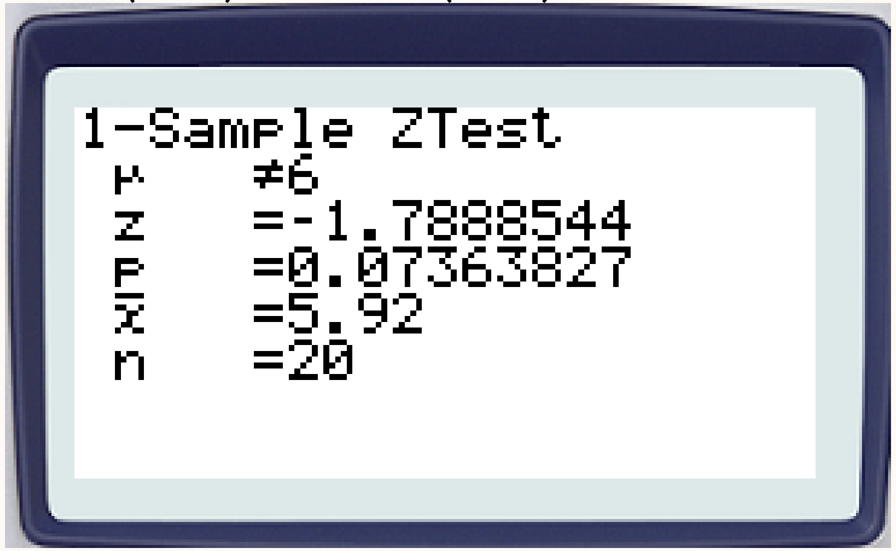
Alternative : the mean length of screws is not 6cm

5% level of significance

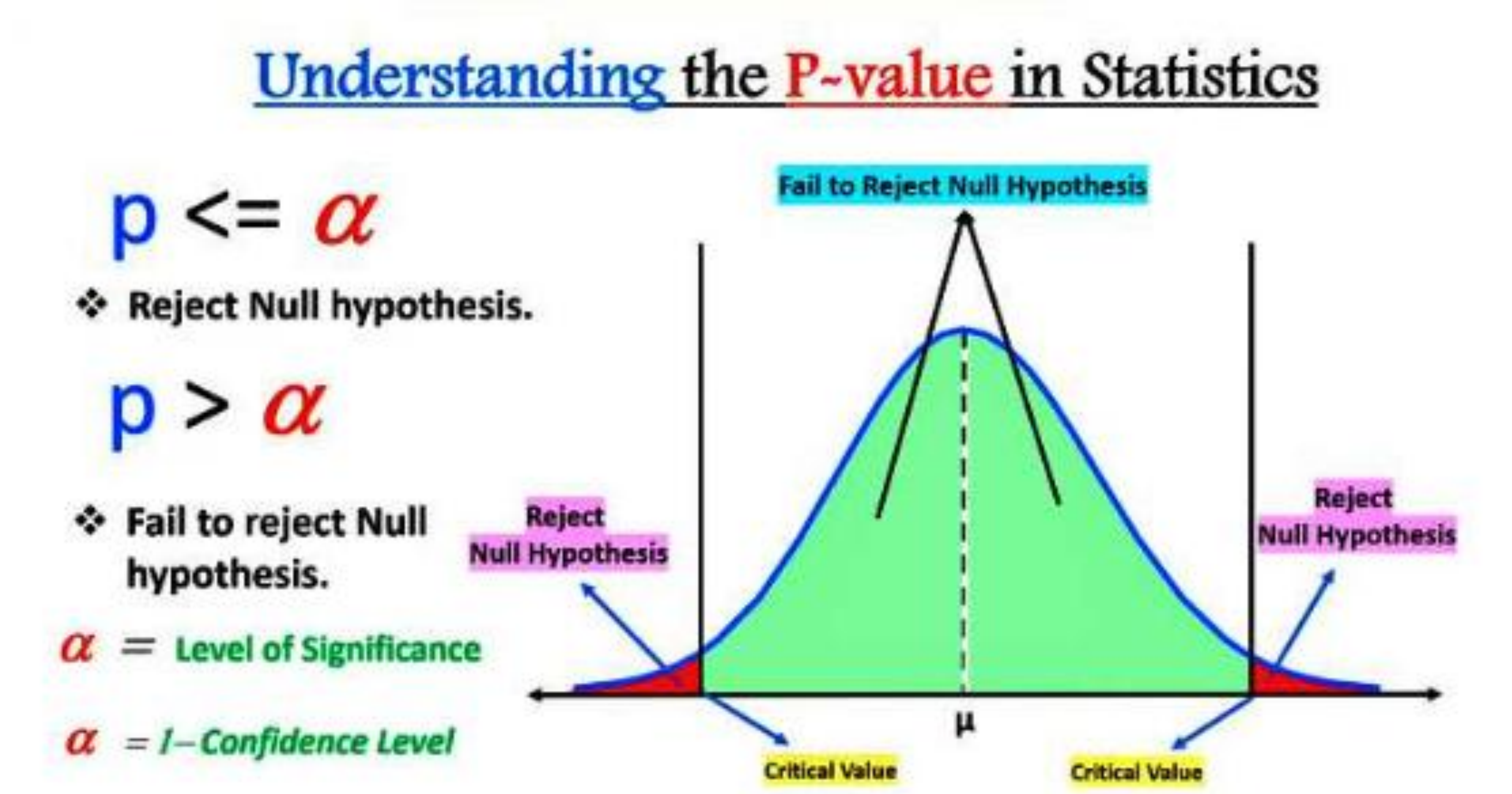
Z test

Menu -> Stat (2) > Test (F3) > Z (F1) > 1-S (F1)





0.0736 > 0.05. There is insufficient evidence to reject the null hypothesis.


Understanding the P-value in Statistics
p <= α
Reject Null hypothesis.
p > α
Fail to reject Null hypothesis.
α = Level of Significance
α = 1–Confidence Level
Fail to Reject Null Hypothesis
Reject Null Hypothesis
Reject Null Hypothesis
μ
Critical Value
Critical Value

EXAMPLE 2 :FROM PPT1

The reaction time in catching a falling rod is believed to be normally distributed with mean 0.9 seconds and standard deviation 0.2 seconds. Xinyi believes that her reaction times are faster than this.

EXAMPLE 2: CRITICAL VALUE METHOD

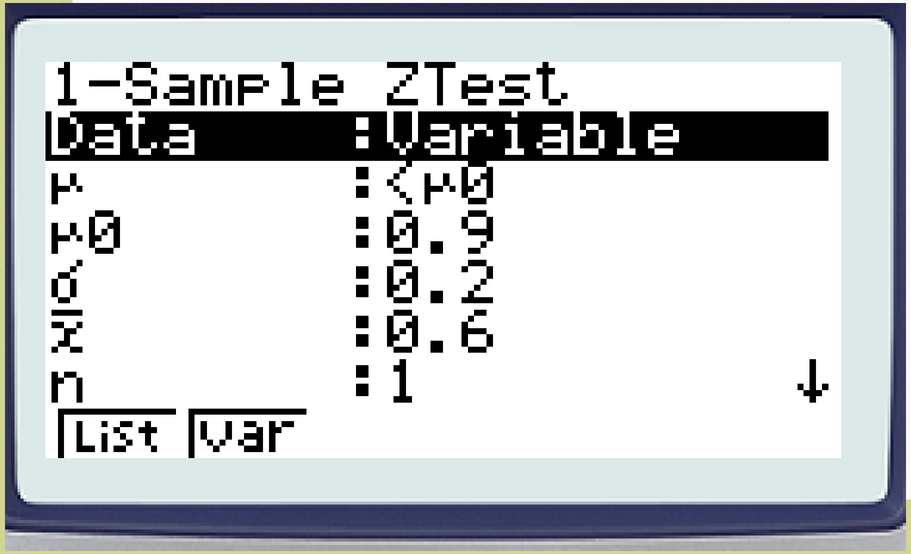
Ho : μ =0.9, mean catching time is 0.9 seconds, not faster

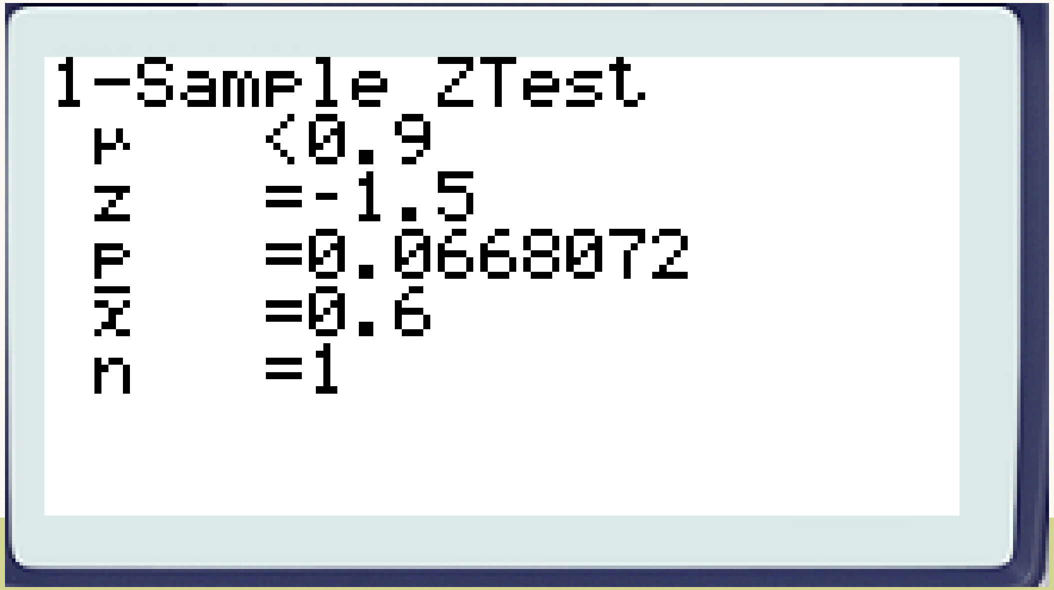
Ha : μ<0.9, the claim is faster, so less than 0.09 seconds. We have a 1-tailed test.

5% level of significance

Z test

Under *Ho*, *X*~*N*(0.9, ⟦0.2⟧^2) Inverse normal (0.95, 0, 1) = ±1.645. This is our critical value.





EXAMPLE 3 : UNPAIRED TWO SAMPLE POPULATION

A scientist wants to test whether two different species of mice have tails of the same length. She has reason to believe that the tail lengths for both species are distributed normally, the first with standard deviation 6.3 cm and the second with standard deviation 4.8 cm.

She finds that the mean tail length for a random sample of 12 mice from species A is 17.3 cm, and the mean tail length for a random sample of 8 mice from species B is 20.6 cm. Test, using a 10% significance level, whether the two species have different tail lengths on average.

EXAMPLE 3 : UNPAIRED TWO SAMPLE POPULATION

EXAMPLE 4: PAIRED SAMPLES

A tennis coach wants to determine whether a new racquet improves the speed of his students' serves (faster serves are considered better). She randomly selects a group of nine children and measures their service speed with their current racquet and with the new racquet, in metres per second. The results are shown in the table below.

Child	A	B	C	D	E	F	G	H	I
Speed with current racquet	58	68	49	71	80	57	46	57	66
Speed with new racquet	72	81	52	59	75	72	48	62	70

EXAMPLE 4: PAIRED SAMPLES

THANK YOU

Brita Tamm
502-555-0152
brita@firstupconsultants.com
www.firstupconsultants.com