

## Hypothesis Testing - Terminology

Term	Example	Definition
Null Hypothesis	<ul style="list-style-type: none"> <li>“Dave did not commit the crime”</li> <li>“The drug does not have any effect”</li> <li><math>H_0: \mu = 83</math></li> </ul>	The proposal that <i>everything is normal</i> or that <i>the thing you say is true</i> .
Alternate Hypothesis	<ul style="list-style-type: none"> <li>“Dave committed the crime”</li> <li>“The drug does have an effect”</li> <li><math>H_1: \mu &lt; 83</math></li> <li><math>H_1: \mu \neq 83</math></li> </ul>	The proposal that <i>everything is not normal</i> or that <i>the thing you say is false</i> .
One tailed test	<ul style="list-style-type: none"> <li>“The drugs have a positive effect”</li> <li><math>H_1: \mu &lt; 83</math></li> </ul>	A test which involves testing only one end of a distribution.
Two tailed test	<ul style="list-style-type: none"> <li>“The drugs have an effect, be it positive or negative”</li> <li><math>H_1: \mu \neq 83</math></li> </ul>	A test which involves testing both ends of a distribution.
Test Statistic	$z = \frac{\bar{x} - 83}{\frac{10}{\sqrt{36}}} = 0.6(\bar{x} - 83)$	The parameter of the distribution on which the test is to be conducted, often based on $\bar{x}$ .
Significance Level	5% (5% significance level on a two tailed test is 2.5% at either end of the distribution)	The probability of the test statistic appearing in the critical region and, therefore, the probability of rejecting the null hypothesis when it may in fact be correct.
Critical Region	For a two tailed test, 5% significance level $\Rightarrow$ $z = \pm 1.96$ $ z  > 1.96$	The values of the test statistic which make up the tail(s) of the distribution as determined by the significance level.
Critical Value	$\bar{x} = 86.2 \square z = 1.92$	The value of the sample statistic being compared to the critical region.
Type 1 error	<ul style="list-style-type: none"> <li>Concluding that Bill is guilty when he is in fact innocent.</li> <li>A False positive.</li> </ul>	Rejecting $H_0$ (and accepting $H_1$ ) when it is in fact correct.
Type 2 error	<ul style="list-style-type: none"> <li>Concluding that Bill is innocent when he is in fact guilty.</li> </ul>	Accepting $H_0$ (and rejecting $H_1$ ) when it is in fact not true.