Usually, the null hypothesis is formulated with an equality sign (=), while the alternative hypothesis uses one of ($\neq, <, >$).

Rejection Region for a Test Statistic: To test the validity of H_0, we choose a **test statistic** T(X) of the data for which we can find the distribution under H_0.

The "art" of hypothesis testing is to define the test by identifying a rejection region $R \subseteq \mathbb{R}$ of low probability values of T under the assumption that H_0 is true, so that $\boldsymbol{P(T \in R | H_0) = \alpha}$ for some small probability α (say 5%). We call α the **significance level** of the test. α is the overall probability of all rejection region.

Confidence level = 1- α.

Rule: A well-chosen rejection region will have relatively high probability under H_1, whilst retaining low probability under H_0.

We calculate the observed test statistic t(x) for our sample x:

1. If $t \in R$ we "**reject** the null hypothesis at the 100α% level".
2. If $t \notin R$ we "**retain** the null hypothesis at the 100α% level".