

Hypothesis Testing

Null

Alternative

P-value

Significance tests for a mean

Based on our results from Section 6.2 of the notes, we can develop hypothesis tests for the true mean value of a distribution in various situations, given an iid sample X_1, \dots, X_n where $H_0 : \mu = \mu_0$.

Let K be the value of the test statistic, $Z \sim N(0, 1)$, and $T \sim t_{n-1}$. Here is a table of p -values that you should use for each set of conditions and choice of H_a .

Situation	K	$H_a : \mu \neq \mu_0$	$H_a : \mu < \mu_0$	$H_a : \mu > \mu_0$
$n \geq 25, \sigma$ known	$\frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$	$P(Z > K)$	$P(Z < K)$	$P(Z > K)$
$n \geq 25, \sigma$ unknown	$\frac{\bar{x} - \mu_0}{s/\sqrt{n}}$	$P(Z > K)$	$P(Z < K)$	$P(Z > K)$
$n < 25, \sigma$ unknown	$\frac{\bar{x} - \mu_0}{s/\sqrt{n}}$	$P(T > K)$	$P(T < K)$	$P(T > K)$

Note: if $K < 0 \Rightarrow$ use $|K|$ in p -value. For two sided tests only!