Testing Statistical Hypotheses

One Sample Problem:

$\boldsymbol{\sigma}^2$ known, normal population

Null Hypothesis: H_0	Alternative Hypothesis: H_1	Test Statistic	Rejection Region	p-value
$\mu = \mu_0$	$\mu \neq \mu_0$	$z = \dfrac{\bar{x} - \mu_0}{\sigma / \sqrt{n}}$	$\lvert z\rvert > z_{\alpha/2}$	$2P(Z > \lvert z\rvert)$
$\mu \geq \mu_0$	$\mu < \mu_0$		$z < -z_{\alpha}$	$P(Z < z)$
$\mu \leq \mu_0$	$\mu > \mu_0$		$z > z_{\alpha}$	$P(Z > z)$

$\boldsymbol{\sigma}^2$ unknown, large sample

Null Hypothesis: H_0	Alternative Hypothesis: H_1	Test Statistic	Rejection Region	p-value
$\mu = \mu_0$	$\mu \neq \mu_0$	$z = \dfrac{\bar{x} - \mu_0}{s / \sqrt{n}}$	$\lvert z\rvert > z_{\alpha/2}$	$2P(Z > \lvert z\rvert)$
$\mu \geq \mu_0$	$\mu < \mu_0$		$z < -z_{\alpha}$	$P(Z < z)$
$\mu \leq \mu_0$	$\mu > \mu_0$		$z > z_{\alpha}$	$P(Z > z)$

$\boldsymbol{\sigma}^2$ unknown, small sample, normal population

Null Hypothesis: H_0	Alternative Hypothesis: H_1	Test Statistic	Rejection Region	p-value
$\mu = \mu_0$	$\mu \neq \mu_0$	$t = \dfrac{\bar{x} - \mu_0}{s / \sqrt{n}}$	$\lvert t\rvert > t_{\alpha/2,n-1}$	$2P(t_{n-1} > \lvert t\rvert)$
$\mu \geq \mu_0$	$\mu < \mu_0$		$t < -t_{\alpha,n-1}$	$P((t_{n-1} < t)$
$\mu \leq \mu_0$	$\mu > \mu_0$		$t > t_{\alpha,n-1}$	$P((t_{n-1} > t)$

A population proportion, large sample

Null Hypothesis: H_0	Alternative Hypothesis: H_1	Test Statistic	Rejection Region	p-value
$\pi = \pi_0$	$\pi \neq \pi_0$	$z = \dfrac{p - \pi_0}{\sqrt{\pi_0(1-\pi_0)/n}}$	$\lvert z\rvert > z_{\alpha/2}$	$2P(Z > \lvert z\rvert)$
$\pi \geq \pi_0$	$\pi < \pi_0$		$z < -z_{\alpha}$	$P(Z < z)$
$\pi \leq \pi_0$	$\pi > \pi_0$		$z > z_{\alpha}$	$P(Z > z)$