| Population Parameter | Population mean |
| --- | --- |
| Null hypothesis | $\mu = \mu_0$ |
| Test statistic | $\frac{\bar{x}-\mu_0}{s/\sqrt{n}}$ OR $\frac{\bar{x}-\mu_0}{\sigma/\sqrt{n}}$ based on if population variance is known |
| Case 1 | $n > 40$<br>OR<br>$n < 40$ AND population distribution is normal AND population variance is known |
| Case 2 | $n < 40$ AND population distribution is normal AND variance not known |
| Otherwise | Consult a knowledgeable statistician |

| Population Parameter | Sample proportion |
| --- | --- |
| Null hypothesis | $p = p_0$ |
| Test statistic | $\frac{p' - p_0}{\sqrt{p_0(1-p_0)/n}}$ |
| Case 1 | $np_0 > 10$ AND $n(1-p_0) > 10$ |
| Otherwise | Consult a knowledgeable statistician |

| **Alternate Hypothesis test type** | **Rejection region Case 1** | **Rejection region Case 2** |
| --- | --- | --- |
| $H_a\colon \mu > \mu_0$<br>Or<br>$H_a\colon p > p_0$ | $(z_\alpha, \infty)$ | $(t_{\alpha,n-1}, \infty)$ |
| $H_a\colon \mu < \mu_0$<br>Or<br>$H_a\colon p < p_0$ | $(-\infty, -z_\alpha)$ | $(-\infty, -t_{\alpha,n-1})$ |
| $H_a\colon \mu \neq \mu_0$<br>Or<br>$H_a\colon p \neq p_0$ | $(-\infty, -z_{\frac{\alpha}{2}}) \cup (z_{\frac{\alpha}{2}}, \infty)$ | $(-\infty, -t_{\frac{\alpha}{2},n-1}) \cup (t_{\frac{\alpha}{2},n-1}, \infty)$ |

Reject if test statistic belongs to rejection region

| **Hypothesis test type** | **P-values Case 1** |
| --- | --- |
| $H_a\colon \mu > \mu_0$<br>Or<br>$H_a\colon p > p_0$ | $1 - \phi(z)$ |
| $H_a\colon \mu < \mu_0$<br>Or<br>$H_a\colon p < p_0$ | $\phi(z)$ |
| $H_a\colon \mu \neq \mu_0$<br>Or<br>$H_a\colon p \neq p_0$ | $2[1 - \phi(\lvert z\rvert)]$ |

Reject if $\alpha > P$ value