**Summary of Hypothesis** Test about a population mean: $\sigma$ **unKnown**
**One-Sample T Test**: t-distribution

$H_0$ : Null Hypothesis, $\mu_0$ = Hypothesized mean, $s$ = sample standard deviation, $df = n - 1$

| | **Two-Tailed Test** | **Lower Tail Test** | **Upper Tail Test** |
|---|---|---|---|
| **Hypothesis** | $H_0 : \mu = \mu_0$ <br> $H_a : \mu \neq \mu_0$ | $H_0 : \mu = \mu_0$ <br> $H_a : \mu < \mu_0$ | $H_0 : \mu = \mu_0$ <br> $H_a : \mu > \mu_0$ |
| **Test Statistic** | $t - test = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ | $t - test = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ | $t - test = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ |
| **Rejection Rule:** <br> *p*-Value approach | Reject $H_0$: if <br> $p$-value $\leq a$ | Reject $H_0$: if <br> $p$-value $\leq a$ | Reject $H_0$: if <br> $p$-value $\leq a$ |
| **Rejection Rule:** <br> Critical Value | Reject $H_0$: if <br> $t - test \leq -t_{a/2}$ or <br> $t - test \geq t_{a/2}$ | Reject $H_0$: if <br> $t - test \leq -t_a$ | Reject $H_0$: if <br> $t - test \geq t_a$ |
| Example: $a = 0.05$ <br> $n = 25,$ so $df = 24$ | Reject if $p$-value $\leq 0.05$ or <br> $2.064 \leq t - test \leq -2.064$ | Reject if $p$-value $\leq 0.05$ <br> or $t - test \leq -1.711$ | Reject if $p$-value $\leq 0.05$ <br> or $t - test \geq 1.711$ |
| Example: $a = 0.01$ <br> $n = 25,$ so $df = 24$ | Reject if $p$-value $\leq 0.01$ or <br> $2.797 \leq t - test \leq -2.797$ | Reject if $p$-value $\leq 0.01$ <br> or $z - test \leq -2.492$ | Reject if $p$-value $\leq 0.01$ <br> or $z - test \geq 2.492$ |
| t-distribution <br> Example $a = 0.05$ <br> $n = 25,$ so $df = 24$ |  |  |  |