STAT 113: REFERENCE SHEET FOR ANALYTIC INFERENCE

$$CI: \quad \text{Statistic} \pm \text{Critical Value} \times \widehat{SE}$$

$$\text{Sandardized Test Statistic}: \quad \frac{\text{Statistic} - \text{Null Param.}}{\widehat{SE}}$$

Param.	Stat.	Randomization	Theory SE	Test Dist.	Conditions
p	$\hat{p}$	Simulate from p_0	$\sqrt{\frac{p(1-p)}{n}}$	Normal	$np, n(1-p) \geq 10$
μ	$\bar{x}$	Bootstrap + shift	$\frac{s}{\sqrt{n}}$	t_{n-1}	$n \geq 27$ or Normal pop.
$p_A - p_B$	$\hat{p}_A - \hat{p}_B$	Scramble pairings	$\sqrt{\frac{p_A(1-p_A)}{n_A} + \frac{p_B(1-p_B)}{n_B}}$	Normal	$n_A p_A, n_A(1-p_A), \geq 10$ and $n_B p_B, n_B(1-p_B) \geq 10$
$\mu_A - \mu_B$	$\bar{x}_A - \bar{x}_B$	Scramble pairings	$\sqrt{\frac{s_A^2}{n_A} + \frac{s_B^2}{n_B}}$	$t_{\min(n_A-1, n_B-1)}$	Both $n \geq 27$ or both Normal pops.
μ_D	$\bar{x}_D$	Flip pairs*	$\frac{s_D}{\sqrt{n_D}}$	t_{n_D-1}	$n_{pairs} \geq 27$ or Normal pop. of diffs.
ρ	r	Scramble pairings	$\sqrt{\frac{1-r^2}{n-2}}$	t_{n-2}	Regression conditions
β_1	$\hat{\beta}_1$	Scramble pairings	$\sqrt{\frac{s_\varepsilon^2/s_X^2}{n-2}}$	t_{n-2}	Regression conditions

The main R functions to get tail proportions and quantiles from theoretical distribution models such as Normal and t: (elements in caps, other than `TRUE` and `FALSE`, should be replaced by values).

```
## returns area to the left of CUTOFF in a N(MEAN,SD) distribution
xpnorm(CUTOFF, mean = MEAN, sd = SD, lower.tail = TRUE)
## returns area to the right of CUTOFF
xpnorm(CUTOFF, mean = MEAN, sd = SD, lower.tail = FALSE)
## returns the Pth quantile of a N(MEAN, SD) distribution
## (i.e., the value with proportion P below it)
xqnorm(PROPORTION, mean = MEAN, sd = SD, lower.tail = TRUE)
## returns the (1 - P)th quantile of a N(MEAN, SD) distribution
## (i.e., the value with proportion P above it)
xqnorm(PROPORTION, mean = MEAN, sd = SD, lower.tail = FALSE)
```

For a t-distribution, replace `norm` with `t` (e.g, `xpt()` and `xqt`), and instead of `mean=` and `sd=`, supply degrees of freedom with `df=`.