P8130 Recitation 3: Oct 2nd/4th

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Key Words: Sample Size Calculation, Type I Error/Power Evaluation

```
rm( list = ls() ) # clear workspace

if ( !require(pacman) ) install.packages('pacman')
pacman::p_load(dplyr, ggplot2)
pacman::p_load(pwr)
```

Sample Size Calculation

```
power.t.test(power = .90, delta = 4.7, sd = 6.99)
```

```
##
##      Two-sample t test power calculation
##
##              n = 47.46322
##          delta = 4.7
##             sd = 6.99
##      sig.level = 0.05
##          power = 0.9
##    alternative = two.sided
##
## NOTE: n is number in *each* group
```

```
pwr.t.test(d = 4.7/6.99, power = .90, type = 'two.sample')
```

```
##
##      Two-sample t test power calculation
##
##              n = 47.46323
##              d = 0.6723891
##      sig.level = 0.05
##          power = 0.9
##    alternative = two.sided
##
## NOTE: n is number in *each* group
```

Simulation-Based Type I Error/Power Evaluation

```
sigma <- 6.99;
delta <- 4.7;
n <- 48

rej <- function(delta, sigma, n, null, alpha = .05) {
```

```
  grp1 <- rnorm(n, 0, sigma)

  if (null) {
    grp2 <- rnorm(n, 0, sigma)
  } else {
    grp2 <- rnorm(n, delta, sigma)
  }

  res <- t.test(grp1, grp2, alternative = 'two.sided', var.equal = FALSE)

  return( (rej = res$p.value < alpha) )

}

## Type I Error
set.seed(1)
replicate(1e4, rej(delta, sigma, n, null = TRUE), simplify = TRUE) %>%
  mean(.)
```

```
## [1] 0.0494
```

```
## Power
set.seed(1)
replicate(1e4, rej(delta, sigma, n, null = FALSE), simplify = TRUE) %>%
  mean(.)
```

```
## [1] 0.9024
```