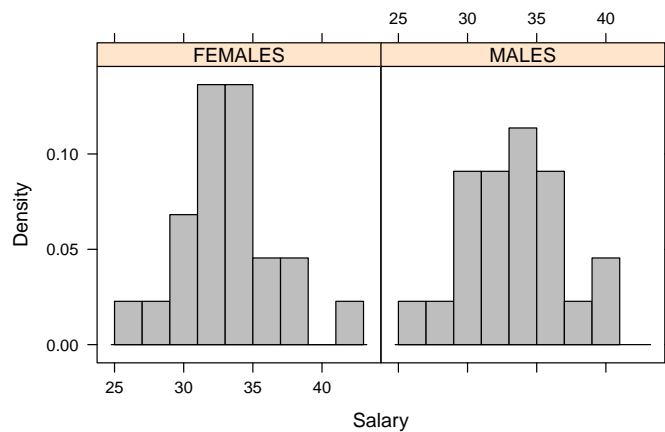


STAT 217: QUIZ 4

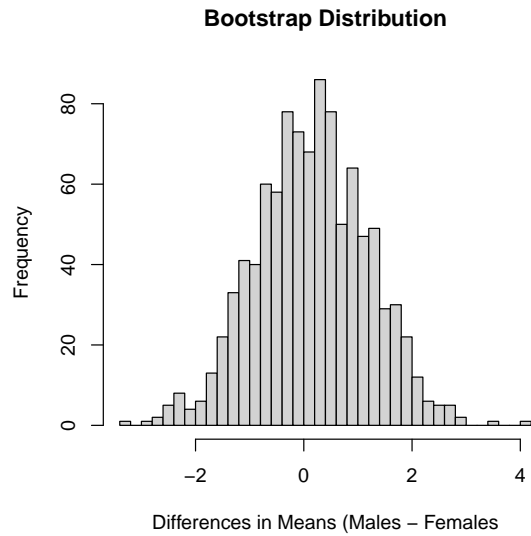
Data were collected to investigate differences in salaries between men and women university professors in America (Reference: *Academe, Bulletin of the American Association of University Professors, year unknown*). Specifically, they were interested in if men's salaries were higher than women's salaries. The units are thousands of dollars (\$1K). The questions on this quiz are based on these data. The observed difference in means was $\bar{y}_M - \bar{y}_F = 0.23182$ thousands of dollars (\$231.8).

- Below are summary statistics and histograms for the two groups. Are the equal variance and distributional assumptions met to run a parametric test?

##	.group	min	Q1	median	Q3	max	mean	sd	n	missing
## 1	FEMALES	25.5	31.2	33.25	34.95	41.2	33.20	3.601	22	0
## 2	MALES	25.3	30.9	33.75	35.25	40.5	33.43	3.546	22	0



- Yes, the histograms are similar in shape.
 - No, the histograms are not similar in shape.
 - Yes, the histograms are approximately unimodal and symmetric and have approximately equal spread.
 - No, the histograms do not meet the nearly normal condition.
- Below is a bootstrapped distribution of differences in means (Males - Females) as well as output for various quantiles. Create an 80% CI for the true difference in mean salaries (Males - Females).



```
##      quantile    p
## 2.5%    -1.819 0.025
## 97.5%    2.109 0.975
##      quantile    p
## 10%     -1.153 0.1
## 90%      1.482 0.9
##      quantile    p
## 5%      -1.516 0.05
## 95%      1.838 0.95
```

3. Interpret the above interval in the context of the problem.

4. Below is output from a t-test.

```
##
## Two Sample t-test
##
## data: Salary by Gender
## t = -0.2151, df = 42, p-value = 0.4154
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##  -Inf 1.581
## sample estimates:
## mean in group FEMALES    mean in group MALES
##           33.20           33.43
```

(a) What is the distribution of the test statistic under the null hypothesis: $\mu_F - \mu_M = 0$?

(b) What is the p-value?

(c) How would you answer the research question?

- i. There is strong evidence against the null hypothesis that there is no difference in the mean salaries paid to male and female professors at American Universities (included in this study). Therefore, we conclude that based on these data male professors at these universities in America have higher average salaries as their female co-workers.
- ii. We conclude that based on these data, male professors at these universities in America receive on average the same salaries than their female co-workers.
- iii. There is not enough evidence to say that there is a difference in the mean salaries paid to male and female professors at American Universities (included in this study).
- iv. There is strong evidence against the null hypothesis that there is no difference in the mean salaries paid to male and female professors at American Universities (included in this study). Therefore, we conclude that based on these data, male professors at these universities in America receive on average the same salaries than their female co-workers.