_____

*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).*

1. 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
```
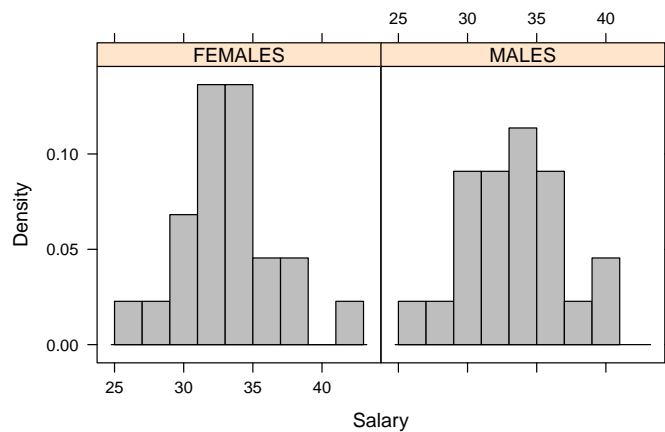

(a) Yes, the histograms are similar in shape.

(b) No, the histograms are not similar in shape.

(c) **Yes, the histograms are approximately unimodal and symmetric and have approximately equal spread.**

(d) No, the histograms do not meet the nearly normal condition.

2. 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).

Bootstrap Distribution

Differences in Means (Males – Females
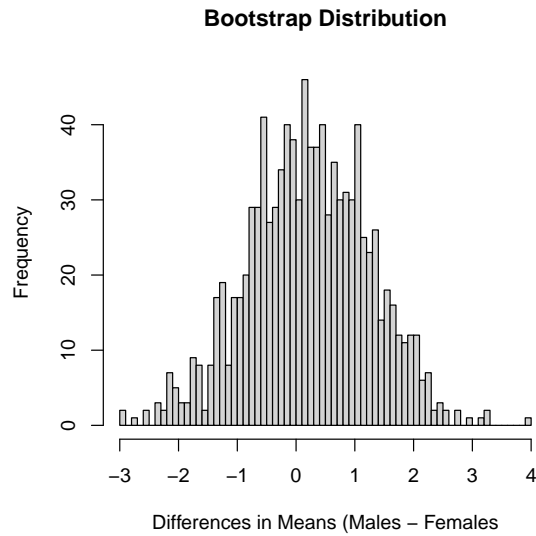
```
##        quantile      p
## 2.5%    -1.864 0.025
## 97.5%    2.130 0.975
##      quantile   p
## 10%   -1.095 0.1
## 90%    1.529 0.9
##      quantile    p
## 5%    -1.428 0.05
## 95%    1.913 0.95
```

3. Interpret the above interval in the context of the problem.
   We are 80% confident that the true difference in mean salaries between men and women university professors in America is between -1.101 *and* 1.49*.*

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: $\mu_F - \mu_M = 0$?
   t-distribution with 42 *df*

(b) What is the p-value?
   p-value=0.4154

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(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 strog 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.