

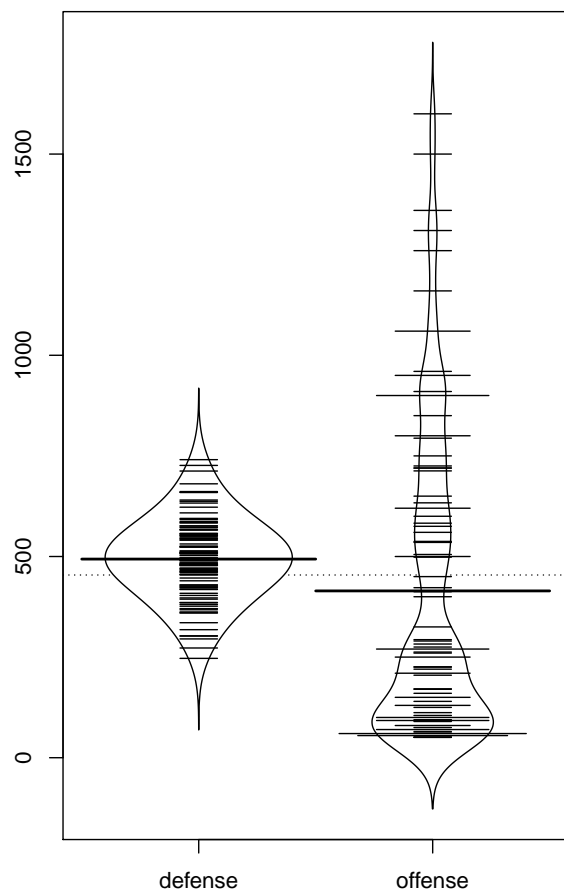
STAT 217: In Class 9/2

Researchers are interested in whether offensive players earn higher salaries than defensive players in the NFL. 100 offensive players and 100 defensive players were randomly sampled, and their annual salaries were recorded (10000s of dollars). The `favstats` are shown below.

```
favstats(premium~position, data=noise)
```

```
##   position  min  Q1 median  Q3  max mean  sd   n missing
## 1  defense 246.8 428   492 555  741  494 100 100      0
## 2  offense  50.6  94   266 637 1600  415 382 100      0
```

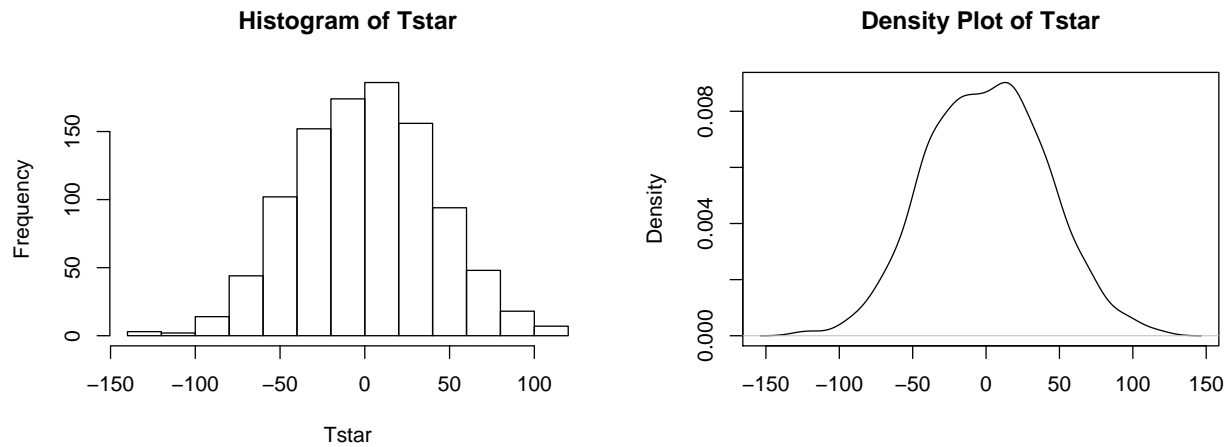
```
require(beanplot)
beanplot(premium~position, data=noise, col="white", log="")
```



1. Assess the assumptions for a two sample t-test.

2. Assess the assumptions for a permutation test.

3. The permutation distribution is shown below, along with the code used to generate it. Recall that the permutation distribution plots sample statistics that we would see if the null hypothesis were true. Draw a vertical line on the histogram at the observed difference in means. Then estimate the p-value.



4. Write a conclusion based on your p-value. Use a 95% confidence interval of $[10, 160]$

5. Write a Scope of Inference.

6. Write a scope of inference for the following:

- (a) Susan Sound predicts that students will learn most effectively with a constant background sound, as opposed to an unpredictable sound or no sound at all. She randomly selects 24 students at Whatcom Community College for the study. She randomly divides twenty-four students into three groups of eight. All students study a passage of text for 30 minutes. Those in group 1 study with background sound at a constant volume in the background. Those in group 2 study with noise that changes volume periodically. Those in group 3 study with no sound at all. After studying, all students take a 10 point multiple choice test over the material.

- (b) In an industrial laboratory, under uniform conditions, 28 batches of electrical insulating fluid were subjected to constant voltages until the insulating property of the fluids broke down. Each of the batches were subject to one of seven voltage levels and the measured reponses were the times until breakdown.

7. If time: The output from `t.test` is shown below. Are the results similar to what you got from the permutation test? Draw a picture to describe how you would find the p-value, and explain how this test differs from the permutation test.

```
t.test(premium~position, data=noise, var.equal=TRUE, alt="greater")
```

```
Two Sample t-test
data:  premium by position
t = 2.0043, df = 198, p-value = 0.0232
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
 13.87332      Inf
sample estimates:
mean in group defense mean in group offense
      493.5688           414.5004
```