STA 210: HW 1

Your Name

The Date

Question 1: Ex. #2.16

```
#use case0101 data set from the Sleuth3 library
```

Question 2: Oscars and Age

a

```
# Use the oscar_winners data set
```

b

Let Group 1 be actors and Group 2 be actresses. We would like to test the hypotheses

$$H_0 : \mu_1 - \mu_2 = 0$$
$$H_a : \mu_1 - \mu_2 > 0$$

These hypotheses can also be written as

$$H_0 : \mu_1 = \mu_2$$
$$H_a : \mu_1 > \mu_2$$

```
#put the actors and actresses in separate data frames to conduct the t test in R
best_actor <- as.data.frame(oscar_winners %>%
  filter(category=="Best Actor") %>%
  select(age))
best_actress <- as.data.frame(oscar_winners %>%
  filter(category=="Best Actress") %>%
  select(age))
```

```
t.test(best_actor, best_actress, alternative="greater")
```

```
##
##  Welch Two Sample t-test
##
```

```
## data:  best_actor and best_actress
## t = 5.0702, df = 166.74, p-value = 5.242e-07
## alternative hypothesis: true difference in means is greater than 0
## 95 percent confidence interval:
##  5.255416      Inf
## sample estimates:
## mean of x mean of y
##  43.82222  36.02222
```

The test produced a p-value of 5.242e-07, which is very strong evidence against H_0. Thus, there is sufficient evidence that movie actors are older, on average, than actresses.

c No. The p-value of 5.242e-07 means *given movie actors and actresses have the same average age (H_0 true), the probability of getting a test statistic of 5.0702 in a sample the size of our study is 5.242e-07.*

d

```
t.test(best_actor, best_actress,alternative="two.sided",conf.level=0.9)$conf.int
```

```
## [1]  5.255416 10.344584
## attr(,"conf.level")
## [1] 0.9
```

We are 90% confident that the true mean difference in age between movie actors and actresses is between 5.255 and 10.345.

e No. Our data only includes those actors and actresses who won the Best Actor and Best Actress Academy Awards. Presumably, these actors and actresses are in the top tier of all actors and actresses, and are therefore not reprentative of the entire population of actors and actresses.

Explanations may vary.

Question 3: Ex #3.33

```
# Use the ex0333 dataset from the Sleuth3 package
```