CSC 423 Homework 1

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1.62 – Cooling method for gas turbines

```
load("rdata/GASTURBINE.Rdata")
t.test(GASTURBINE$HEATRATE,alternative = c('greater'),mu = 10000, conf.level = 0.95)
```

```
##
##  One Sample t-test
##
## data:  GASTURBINE$HEATRATE
## t = 5.4729, df = 66, p-value = 3.683e-07
## alternative hypothesis: true mean is greater than 10000
## 95 percent confidence interval:
##  10741.36      Inf
## sample estimates:
## mean of x
##  11066.43
```

a) As we can see, since the p-value is less than 0.05, H_o is rejected at $alpha = 0.05$. It can be interpreted as, There is enough evidence which indicates that the mean heat rate of the gas turbines augumented with high pressure inlet fogging exceeds 10000 kj/kWh.

b) *Type 1*: When H_o is true but we reject it. In this case, it can be interpreted as mean heat rate of gas turbines which are augumented with high pressure inlet fogging exceeds 10000 kj/kWh when it does not.

Type 2: When H_o is false and we faild to reject it. In this case, it can be said that mean heat rate of gas turbines which are augumented with high pressure inlet fogging doesnot exceeds 10000 kj/kWh when it does.

1.67 – Does rudeness really matter in the workplace?

```
library(stringr)
load("rdata/RUDE.Rdata")
RUDE$CONDITION <- as.character(RUDE$CONDITION)
RUDE$CONDITION <- str_trim(RUDE$CONDITION)
cnt <- subset(RUDE, CONDITION == "Control")$USESBRICK
rud <- subset(RUDE, CONDITION == "Rude")$USESBRICK
t.test(cnt, rud, paired=FALSE, alternative = c("greater"), mu = 0, conf.level=0.99, var.equal = TRUE)
```

```
##
##  Two Sample t-test
##
## data:  cnt and rud
## t = 2.6828, df = 96, p-value = 0.004299
```

```
## alternative hypothesis: true difference in means is greater than 0
## 99 percent confidence interval:
##  0.38995     Inf
## sample estimates:
## mean of x mean of y
## 11.811321  8.511111
```

as the p-value is less than the *alpha* here, we reject the H_o, which can be interpreted as, we have enough evidence to conclude that mean performance level in the rudeness condition is less than the mean in the control group.

1.72 – Impact of red light cameras on car crashes.

```
load("rdata/REDLIGHT.Rdata")
REDLIGHT$DIFF <- REDLIGHT$BEFORE - REDLIGHT$AFTER
t.test(REDLIGHT$DIFF, alternative = c("two.sided"), mu = 0, conf.level=0.95)
```

```
##
##  One Sample t-test
##
## data:  REDLIGHT$DIFF
## t = 3.0023, df = 12, p-value = 0.01102
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  0.2761796 1.7376666
## sample estimates:
## mean of x
##  1.006923
```

Again as the p-value is less than *alpha* we reject H_o. It concluded that the photo red enforcement programs is indeed reducing the red ligh running crash incidents at intersections.

1.75 – Is honey a cough remedy?

```
load("rdata/HONEYCOUGH.Rdata")
HONEYCOUGH$TREATMENT <- as.character(HONEYCOUGH$TREATMENT)
HONEYCOUGH$TREATMENT <- str_trim(HONEYCOUGH$TREATMENT)
honey_group <- subset(HONEYCOUGH, TREATMENT == "H")$TOTSCORE
dm_group <- subset(HONEYCOUGH, TREATMENT == "DM")$TOTSCORE
var(honey_group);var(dm_group)
```

```
## [1] 8.151261
```

```
## [1] 10.60417
```

```
var.test(dm_group,honey_group)
```

```
##
##  F test to compare two variances
##
## data:  dm_group and honey_group
## F = 1.3009, num df = 32, denom df = 34, p-value = 0.4514
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.6518927 2.6153466
## sample estimates:
## ratio of variances
##           1.300924
```

Since the p-values is greater than our *aplha*, we fail to reject H_o and accept H_a.

1.78 – Human inspection errors

```
load("rdata/INSPECT.Rdata")
INSPECT$InspGroup <- as.character(INSPECT$InspGroup)
INSPECT$InspGroup <- str_trim(INSPECT$InspGroup)
novice <- subset(INSPECT, InspGroup == "1Novice")$Errors
expe <- subset(INSPECT, InspGroup == "2Exper")$Errors
var(novice);var(expe)
```

```
## [1] 74.69697
```

```
## [1] 32.99242
```

```
var.test(novice,expe,conf.level = 0.95)
```

```
##
##  F test to compare two variances
##
## data:  novice and expe
## F = 2.2641, num df = 11, denom df = 11, p-value = 0.1911
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.6517733 7.8646780
## sample estimates:
## ratio of variances
##           2.264064
```

No, the sample data doesn't support her belief, as the p-value is greater than 0.05 we do not reject H_o. The appropriate p-value from the above test is 0.1911