STAT4100 HW1

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Chapter 1 Homework (Experiment Design):

Optimized microwave settings and popcorn brand

Response Variable will be the count of unpopped kernels without burning

Power Setting	Time Setting (minutes)	Popcorn Brand
Low	2:00	Costco
High	2:30	Pop Secret

The factos will be as follows: Here's a table with a random run order:

```
##   Power Time     Brand
## 2   Low    2    Costco
## 4   Low  2.5    Costco
## 3  High  2.5    Costco
## 6   Low    2 PopSecret
## 5  High    2 PopSecret
## 7  High  2.5 PopSecret
## 8   Low  2.5 PopSecret
## 1  High    2    Costco
```

Chapter 2 Homework:

No.1

Note: Group A will be treated with 95 C. Group B will be treated with 100 C

```
A <- c(11.176, 7.089, 8.097, 11.739, 11.291, 10.759, 6.467, 8.315)
B <- c(5.263, 6.748, 7.461, 7.015, 8.133, 7.418, 3.772, 8.963)
D <- as.data.frame(cbind(A, B))
t <- t.test(B, A, var.equal = TRUE, conf.level = 0.95)
t
```

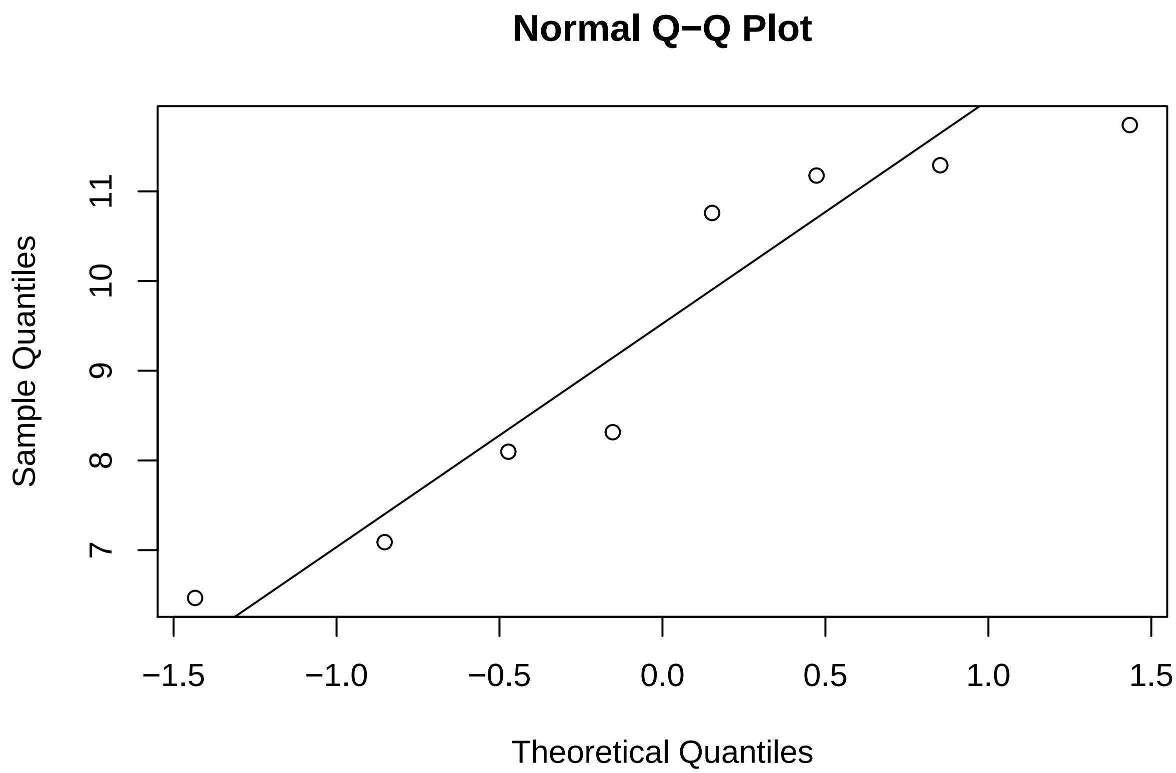
```
##
##  Two Sample t-test
##
## data:  B and A
## t = -2.6751, df = 14, p-value = 0.01812
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
```

```
##  -4.5404257 -0.4995743
## sample estimates:
## mean of x mean of y
##  6.846625  9.366625
```

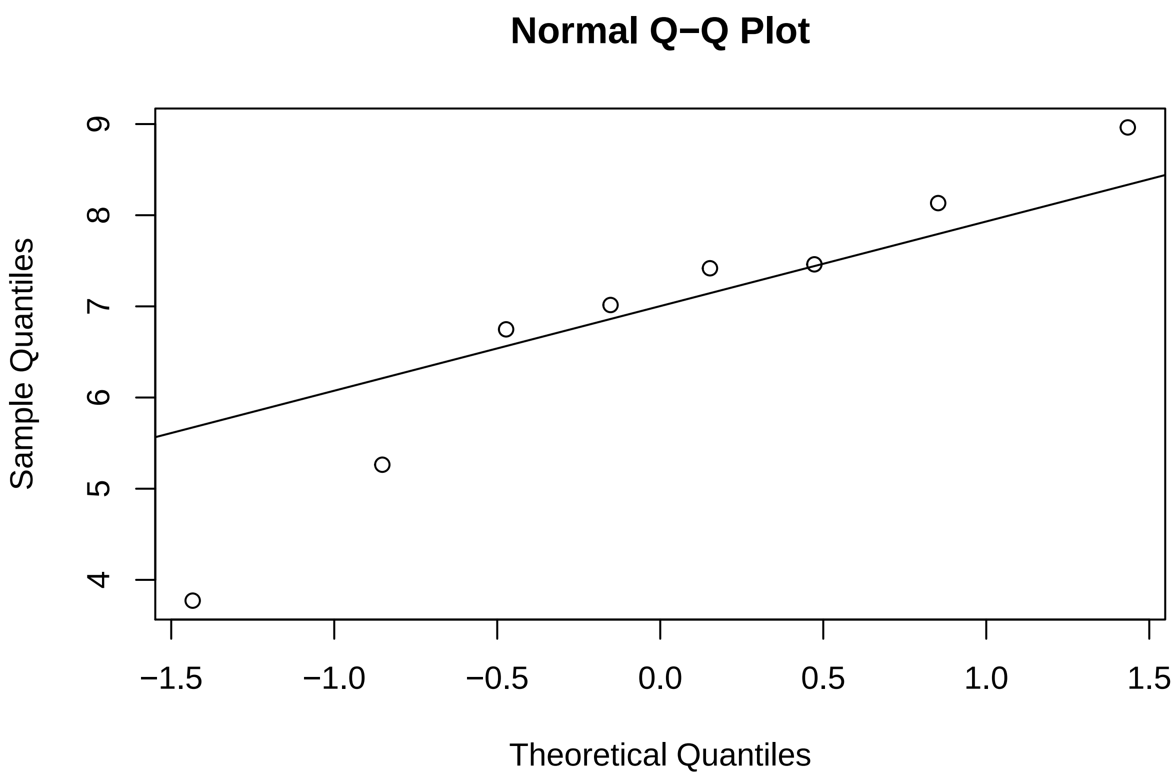
a) There is evidence to suggest there is a meaningful difference between the two baking temperatures. At alpha = 0.05 level we would reject the null hypothesis.

b) The p-value for the test is 0.018118. This is well below 0.05.

c) The confidence interval for this test is [-4.5404257, -0.4995743]. Zero is not contained within this interval. This means it is a statistically significant result.



d) QQ plots below:



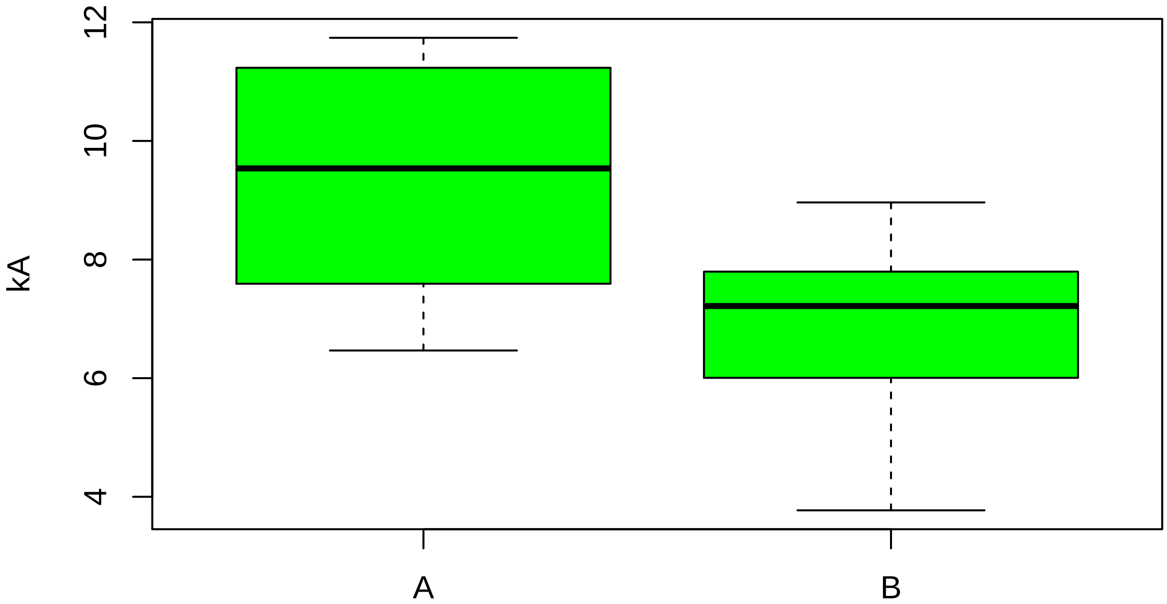

```r
# Shapiro test for normaility
shapiro.test(A)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  A
## W = 0.87501, p-value = 0.1686
```

```r
shapiro.test(B)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  B
## W = 0.9348, p-value = 0.5607
```

```r
boxplot(D, col = "green", ylab = "kA")
```



No.2

```r
y1 <- 93
y2 <- 102
s1 <- 12.9
s2 <- 6.1
n1 <- 10
n2 <- 12
# Note: variances cannot be assumed to be equal:
# adjussted degrees of freedom:
v <- ((((s1^2/n1) + (s2^2/n2))^2) / ((((s1^2/n1)^2)/(n1-1)) + ((s2^2/n2)^2/(n2-1)))
# t test statistic:
t0 <- (y1 - y2) / sqrt((s1^2/n1) + (s2^2/n2))
t0 # t statistic
```

```
## [1] -2.025577
```

```r
pt(t0, df = v) #compute p-value.
```

```
## [1] 0.03251861
```

The test statistic for this test is t = -2.0255771. The critical value, with d.f = 12.3166609, is = -1.3541908. We would reject the null hypothesis at alpha = 0.1. There is evidence to suggest that there are less particulates in a non-smokers home than in a smokers home.