Lab1

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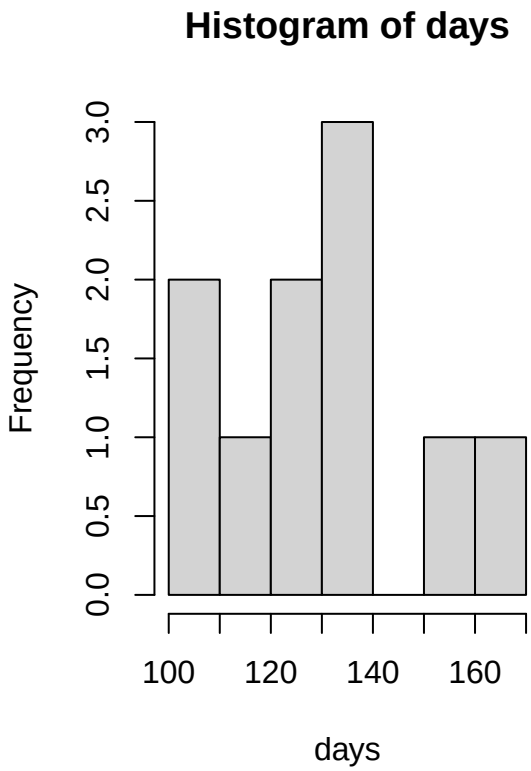
2/3/2022

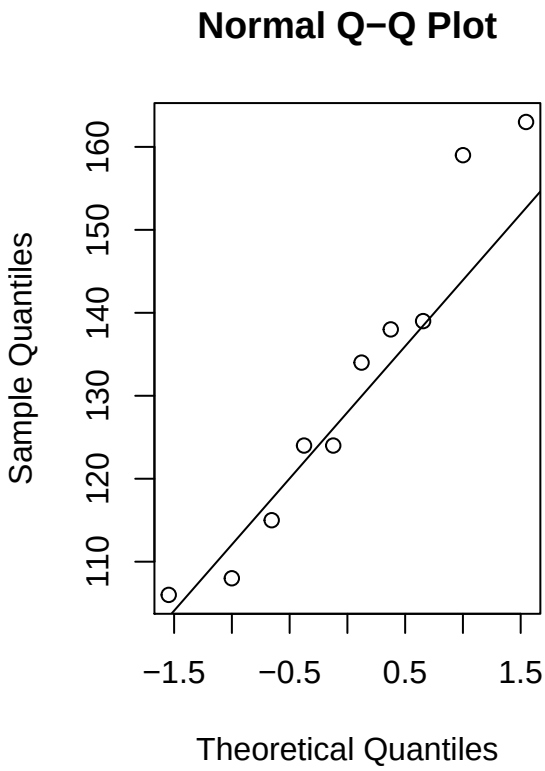
Question.1

Set up hypothesis that the mean life is 120 days

```
## [1] 131
```

```
## [1] 19.54482
```





Null and alternative hypothesis

Ho = mean shelf life of carbonated beverages is 120 days

Ha = mean shelf life of carbonated beverages is smaller than 120 days

The data doesn't appear to be normal and qqplot also underscore that fact.

b. Test these hypothesis using alpha = 00.1. What are your conclusions?

```
##
##  One-sample z-Test
##
## data:  days
## z = 1.7802, p-value = 0.07504
## alternative hypothesis: true mean is not equal to 120
## 99 percent confidence interval:
##  115.0837 146.9163
## sample estimates:
## mean of x
##       131
```

```
##
##  One Sample t-test
##
## data:  days
## t = 1.7798, df = 9, p-value = 0.1088
## alternative hypothesis: true mean is not equal to 120
## 99 percent confidence interval:
##  110.914 151.086
## sample estimates:
## mean of x
##       131
```

Analysis of z test and t test

Both z.test and t.test have p-value > 0.01, so we accept the null hypothesis that the mean values is equal to 120

c Find of the pvalue for the test in b

pvalue for the z test is 0.07504

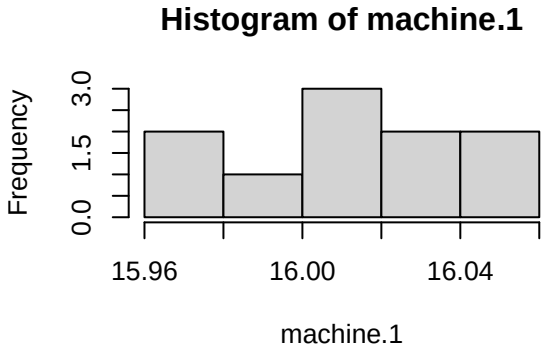
pvalue for the t test is 0.1088

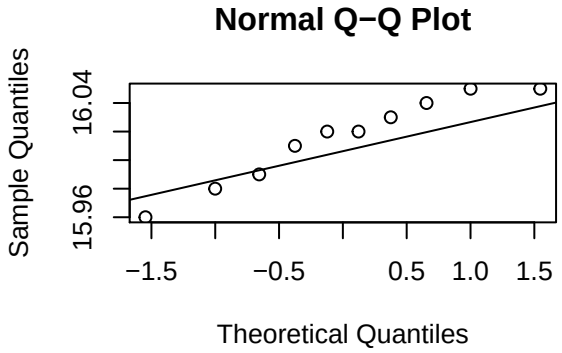
d. Construct a 99 percentile Confidence interval

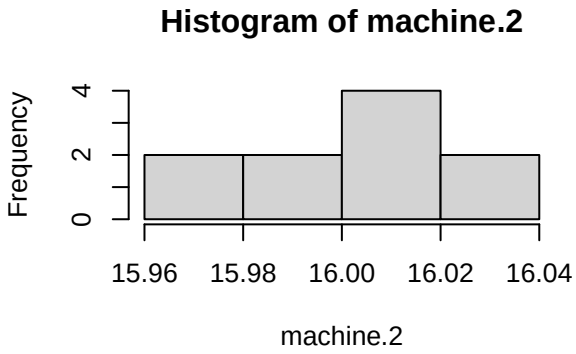
We are also 99% confidence that the mean values are between (115.0837 146.9163), (110.914 151.086) for z.test and t.test respectively.

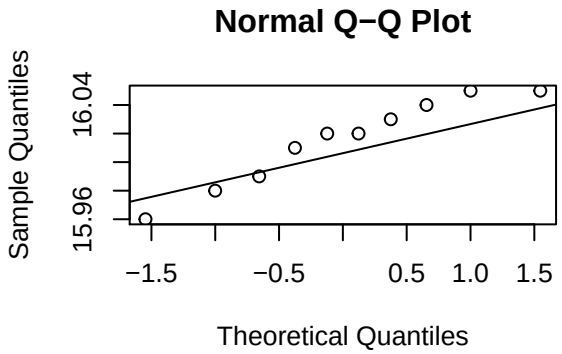
Question 2

```
## [1] 0.01
```









a. State the hypothesis that should be tested in this experiment.

Null and alternative hypothesis

Ho = difference of mean for filled plastic bottle from machine1 and machine2 is 0

Ha = difference of mean for filled plastic bottle from machine1 and machine2 is not 0

b. Test these hypothesis using alpha = 0.05. What are your conclusions?

```
## [1] 10
```

```
## [1] 10
```

```
##
##  Two-sample z-Test
##
## data:  machine.1 and machine.2
## z = 1.3496, p-value = 0.1771
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.004522262  0.024522262
## sample estimates:
## mean of x mean of y
##    16.015    16.005
```

```
##
##  Two Sample t-test
##
## data:  machines by labels
## t = 0.79894, df = 18, p-value = 0.4347
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.01629652  0.03629652
## sample estimates:
## mean in group machine.1 mean in group machine.2
##                  16.015                  16.005
```

Two sample z.test

Two sample z.test has a pvalue >0.05 (p-value = 0.1771), so null hypothesis that the difference of mean is 0 is accepted, and the alternative hypothesis is rejected.

Two sample t.test

Two sample t.test has a pvalue >0.05 (p-value = 0.4347), so null hypothesis that the difference of mean is 0 is accepted, and the alternative hypothesis is rejected.

c. Find the pvalue for this test

The pvalue for z.test is 0.1771 and the pvalue for t.test is 0.4347

d. Find a 95% Confidence interval

95 percent confidence interval for z.test: -0.004522262 0.024522262

95 percent confidence interval: -0.01629652 0.03629652

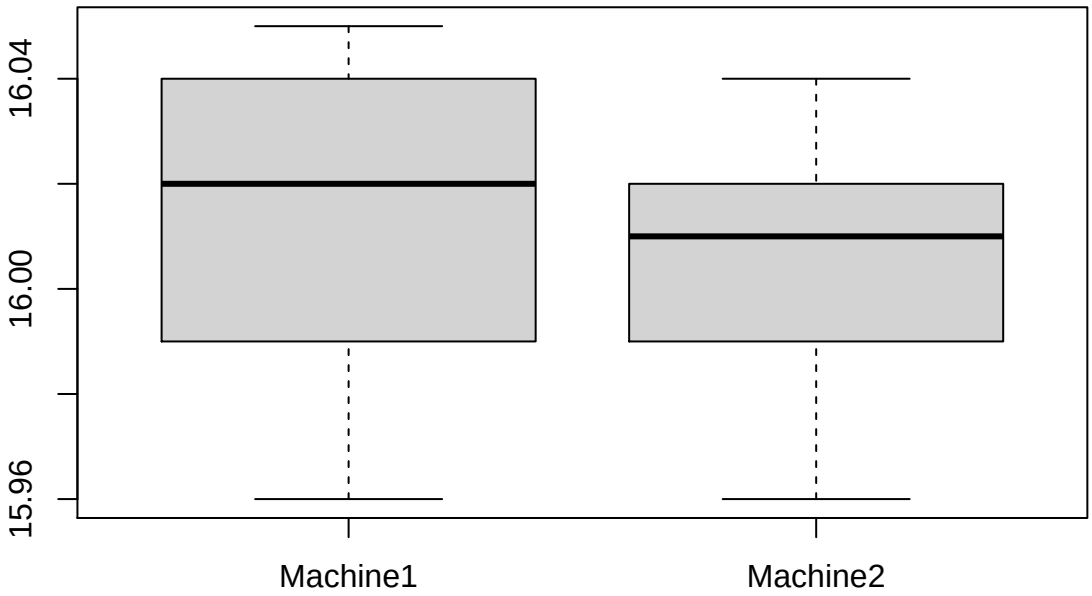
So it may be ascertained that we are 95% confident that the difference of mean for machine 1 and machine 2 will be between -0.004522262 0.024522262 for z.test and -0.01629652 0.03629652 for t.test

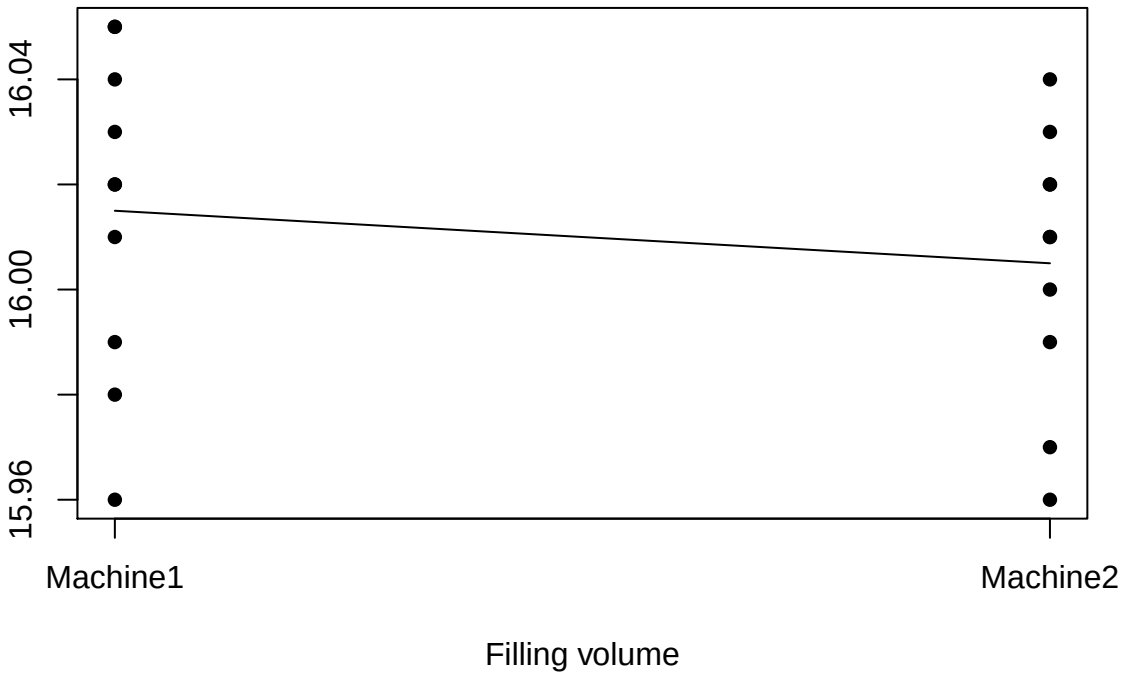
e.Perform a var.test() to check if 2 samples come from equal variance populations.

```
##
##  F test to compare two variances
##
## data:  machine.1 and machine.2
## F = 1.4103, num df = 9, denom df = 9, p-value = 0.6168
## alternative hypothesis: true ratio of variances is not equal to 1
```

```
## 95 percent confidence interval:
##  0.3502877 5.6776841
## sample estimates:
## ratio of variances
##           1.410256
```

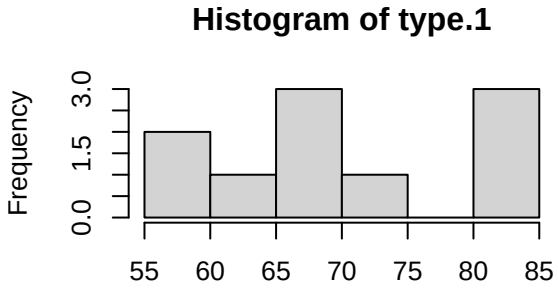
f. Perform a boxplot and a stripchart with line connecting means.

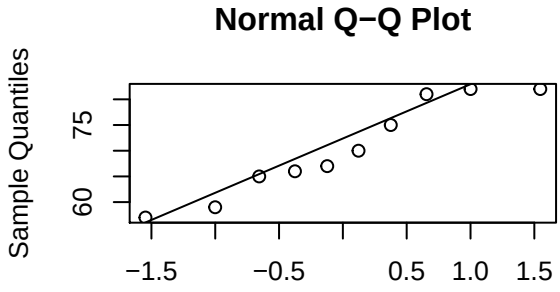


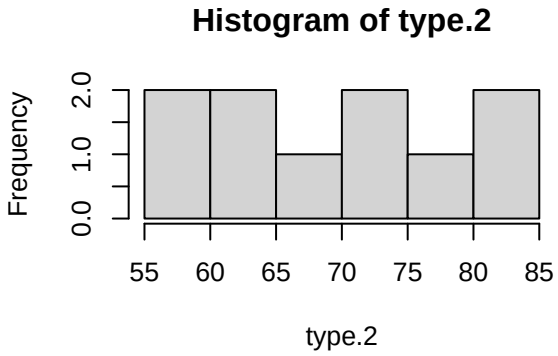


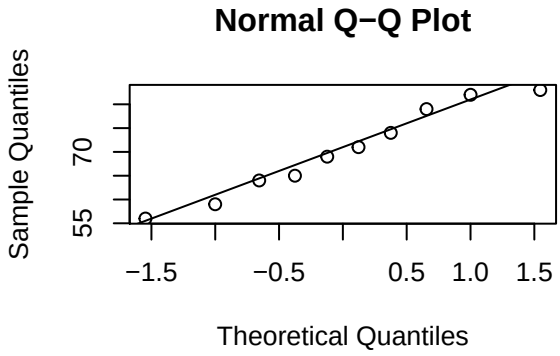
Question.3

```
## [1] "difference of mean 0.200000"
```









Test the hypothesis that the two variances are equal, use alpha= 0.05

Ho: variance for type.1 and type.2 is equal Ha: variance for type.1 and type.2 is not equal

```
##
##  F test to compare two variances
##
## data:  type.1 and type.2
## F = 0.97822, num df = 9, denom df = 9, p-value = 0.9744
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2429752 3.9382952
## sample estimates:
## ratio of variances
##          0.9782168
```

Result

The ratio of variance is almost 1, and the pvalue (0.9744) is greater than 0.05, so that proves that the null hypothesis that the true ratio of variance is equal to 1 is accepted and the alternative hypothesis is rejected.

b. Using the results of (a), test the hypothesis that the mean burning times are equal

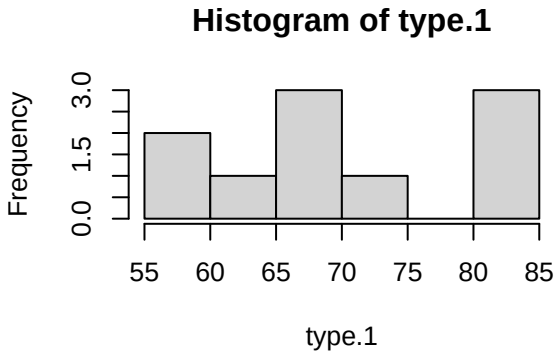
```
##
##  Two Sample t-test
##
## data:  types by labels
## t = 0.048008, df = 18, p-value = 0.9622
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -8.552441  8.952441
## sample estimates:
## mean in group type1 mean in group type2
##                70.4                70.2
```

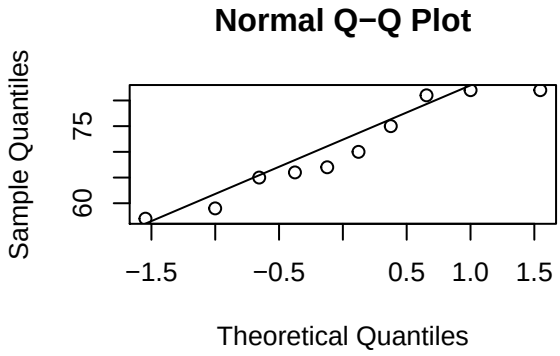
The hypothesis test is that

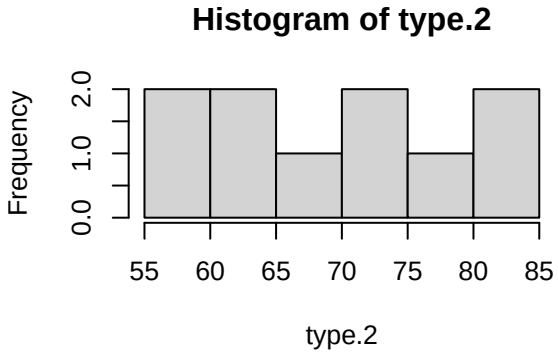
H0 difference of mean is zero Ha difference of mean is not zero

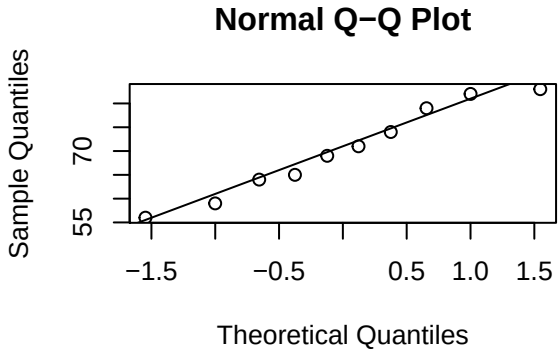
The t.test have a p value >0.05, so the null hypothesis is accepted that the difference of mean is zero The pvalue is 0.9622

c. Discuss the role of normality assumption in this problem. Check the assumptions of normality for both types of flares









The assumptions is that the data is normally distributed and errors are constant. However, the plots, and qqplot shows that the data for type.1 and type.2 is not reliable and the results concluded by var.test and t.test may not be accurate.