SSO Assignment 1

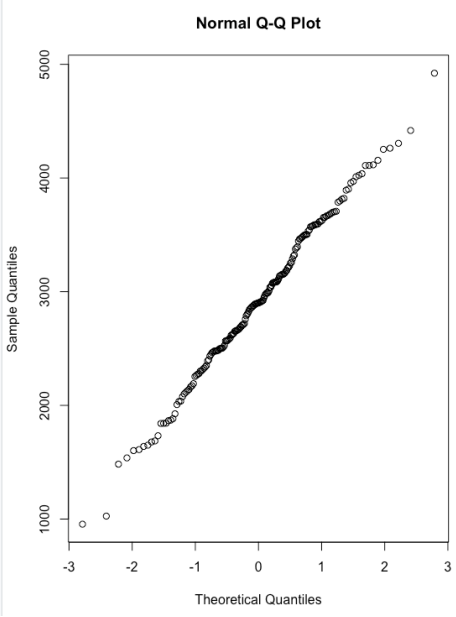
Q1

a. A QQ-plot and Shapiro-Wilk test show that the data is normally distributed, with the QQ-plot (1) points being in a relatively straight line and the Shapiro-Wilk test outcome of 0.9 (2).

b. The bounded 90% confidence interval for mu is between 2829.2 and 2997.4 (3).

c. A t-test was performed using H0: mu ≤ 2800 and H1: mu > 2800 (4). The outcome of this test showed a p-value of 0.013, which is smaller than the alpha of 0.05, meaning that H0 is rejected and H1 is assumed to be true.

d. The confidence interval for (b) is a two-sided interval, meaning that we have boundaries for the interval at both sides of the true mean. This makes sense, because we want to know *where* the true mean is. In (c), all we want to know is whether the truemean is *bigger* than 2800. Therefore, it is one sided and we get the same left value, but no specified right value, as anything bigger than this value will also satisfy H1.



1

```
> #90% confidence interval for mu
> n=length(weights)
> m = mean(weights); m
[1] 2913.293
> s = sd(weights); s
[1] 697.5002
> t = qt(0.95,df=n-1); t
[1] 1.653043
> ci = c(m-t*s/sqrt(n),m+t*s/sqrt(n))
> ci
[1] 2829.202 2997.384
```

3

```
        Shapiro-Wilk normality test

data:  weights
W = 0.99595, p-value = 0.8995
```

2

```
data:  weights
t = 2.2271, df = 187, p-value = 0.01357
alternative hypothesis: true mean is greater than 2800
95 percent confidence interval:
 2829.202      Inf
sample estimates:
mean of x
 2913.293
```

4

Q2

a. ^p = x/n, so 140/200=0.7

b. 99% confidence interval for p = 0.7

   p=0.7

   q=0.3

   n=200

   za/2 = 1-0.005=0.995 so qnorm(0.995)

   qnorm(0.995)*sqrt((0.7*0.3)/200)0.0834

   0.7=0.08 = 0.6166

   0.7 + 0.0834 = 0.7834

   So, CI is between 0.6166 and 0.7834

c. H0: p=0.75
   H1: p ≠ 0.75

number of successes = 0.75*200=150

a=0.1 qnorm(0.95)

```
        Exact binomial test

data:  140 and 200
number of successes = 140, number of trials = 200, p-value = 0.103
alternative hypothesis: true probability of success is not equal to 0.75
95 percent confidence interval:
 0.6313501 0.7626104
sample estimates:
probability of success
                   0.7
```

p-value is 0.103, so H0 is not rejected.

Different confidence intervals:

a = 0.01

```
        Exact binomial test

data:  140 and 200
number of successes = 140, number of trials = 200, p-value = 0.103
alternative hypothesis: true probability of success is not equal to 0.75
99 percent confidence interval:
 0.6099163 0.7803014
sample estimates:
probability of success
                   0.7
```

a=0.2

```
        Exact binomial test

data:  140 and 200
number of successes = 140, number of trials = 200, p-value = 0.103
alternative hypothesis: true probability of success is not equal to 0.75
80 percent confidence interval:
 0.6545921 0.7423676
sample estimates:
probability of success
                   0.7
```

p remains the same for different confidence intervals. why?

Q3

a.