

HW1__632

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Exercise 1

a. $\hat{y} = -1.1016 + 2.2606x$

b. The Null Hypothesis is the slope is equal to zero. The Alternative Hypothesis is that the slope is not equal to zero. Based on the p-value, we reject the Null Hypothesis.

c.

```
2*pt(-2.699, 49)
```

```
## [1] 0.009516191
```

d.

```
2.2606/0.0981
```

```
## [1] 23.04383
```

e.

```
tc = abs(qt(.05/2, 48))  
b = 2.2606  
se = 0.0981  
b + tc*se
```

```
## [1] 2.457843
```

```
b - tc*se
```

```
## [1] 2.063357
```

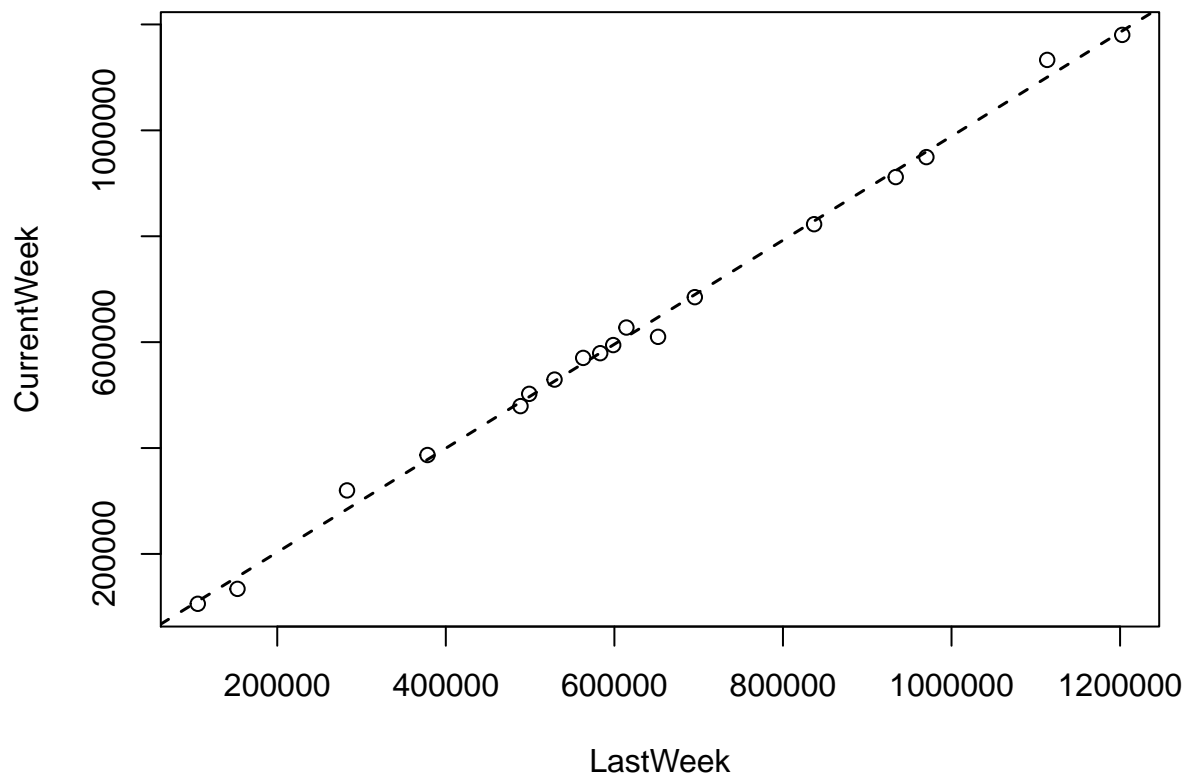
Yes, the interval is not equal to zero so it does agree with the results of the hypothesis test.

Exercise 3

```
setwd("C:/Users/Prashan.Welipitiya/Downloads")  
playbill = read.csv("playbill.csv")
```

a.

```
par(mar=c(4.5,4.5,2,2)) #adjust margins
plot(CurrentWeek ~ LastWeek, data = playbill)
lm1 = lm(data = playbill, CurrentWeek ~ LastWeek)
abline(lm1, lwd=1.5, lty=2)
```



b.

```
confint(lm1)["LastWeek", ]
```

```
##      2.5 %      97.5 %
## 0.9514971 1.0126658
```

1 is plausible because it is in the interval.

C.

```
newdata = data.frame(LastWeek=400000)
predict(lm1, newdata, interval="predict", level=.95)
```

```
##      fit      lwr      upr
## 1 399637.5 359832.8 439442.2
```

d.

The lower and upper confidence levels are too far apart to assume that the two weeks will be equal.

Exercise 4

```
library(alr4)

## Warning: package 'alr4' was built under R version 3.6.2

## Loading required package: car

## Warning: package 'car' was built under R version 3.6.2

## Loading required package: carData

## Loading required package: effects

## Warning: package 'effects' was built under R version 3.6.2

## Registered S3 methods overwritten by 'lme4':
##   method                                from
##   cooks.distance.influence.merMod      car
##   influence.merMod                     car
##   dfbeta.influence.merMod              car
##   dfbetas.influence.merMod             car

## lattice theme set by effectsTheme()
## See ?effectsTheme for details.

#help(oldfaith)
```

a.

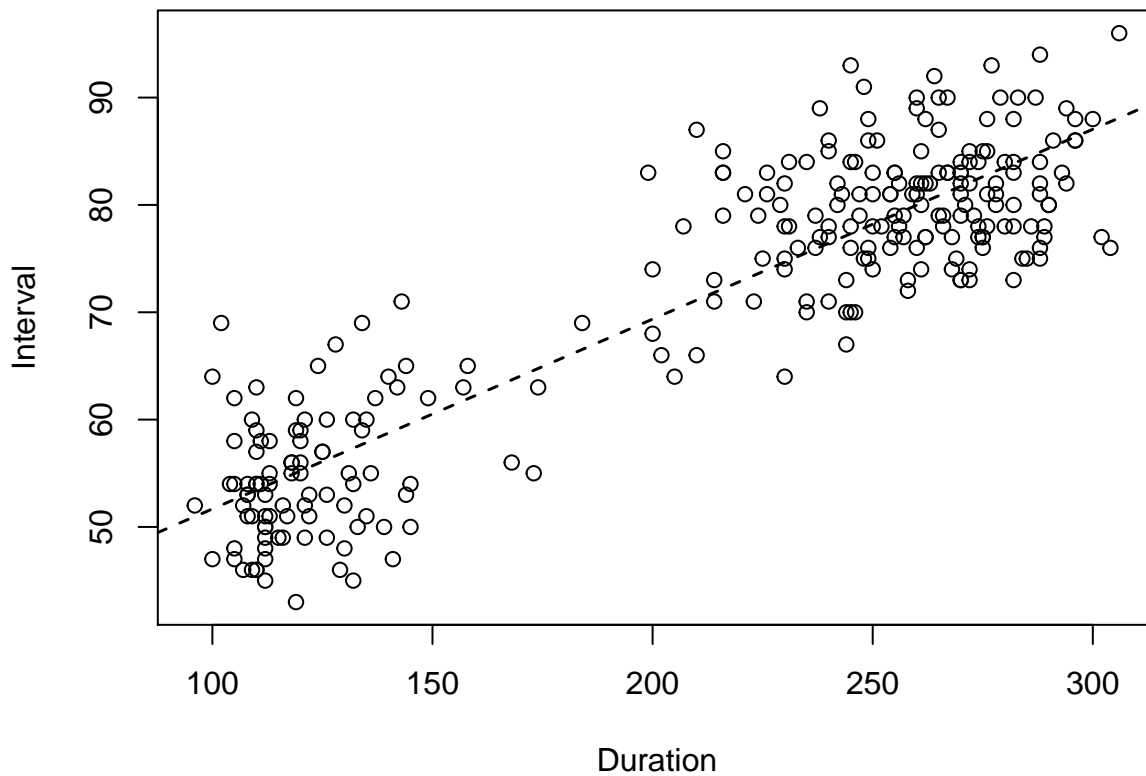
```
lm1 <- lm(Interval ~ Duration, data = oldfaith)
summary(lm1)

##
## Call:
## lm(formula = Interval ~ Duration, data = oldfaith)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12.3337  -4.5250   0.0612   3.7683  16.9722
##
```

```
## Coefficients:
##           Estimate Std. Error t value Pr(>|t|)
## (Intercept) 33.987808   1.181217  28.77  <2e-16 ***
## Duration    0.176863   0.005352  33.05  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 6.004 on 268 degrees of freedom
## Multiple R-squared:  0.8029, Adjusted R-squared:  0.8022
## F-statistic: 1092 on 1 and 268 DF, p-value: < 2.2e-16
```

b.

```
par(mar=c(4.5,4.5,2,2)) #adjust margins
plot(Interval ~ Duration, data = oldfaith)
abline(lm1, lwd=1.5, lty=2)
```



c.

```
newdata = data.frame(Duration=250)
predict(lm1, newdata, interval="predict", level=.95)
```

```
##          fit      lwr      upr
## 1 78.20354 66.35401 90.05307
```

We expect the wait to be 78.2 seconds and the interval is a range of anywhere between 66.35 and 90.05 seconds.

d.

The R squared shows a strong positive linear association.