HW 1

Class: 33:136:487:01 LG SCALE DATA ANALY

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read the data file

```
dat = read.csv("Auto1a.csv")
names(dat)
```

```
## [1] "mpg"          "cylinders"    "displacement" "horsepower"   "weight"
## [6] "acceleration" "year"         "origin"       "name"
```

model-1: mpg~horsepower

```
model = lm(mpg~horsepower, data = dat)
```

coefficients

```
model$coefficients
```

```
## (Intercept)  horsepower
##  38.4121484  -0.1484225
```

CI

```
confint.lm(model)
```

```
##                 2.5 %     97.5 %
## (Intercept) 36.9704297 39.8538670
## horsepower  -0.1610343 -0.1358106
```

summary

```
summary(model)
```

```
##
## Call:
## lm(formula = mpg ~ horsepower, data = dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -12.726  -3.149  -0.633   2.532  17.835
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 38.412148   0.733004   52.40   <2e-16 ***
## horsepower  -0.148422   0.006412  -23.15   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 4.74 on 345 degrees of freedom
## Multiple R-squared:  0.6083, Adjusted R-squared:  0.6072
## F-statistic: 535.8 on 1 and 345 DF,  p-value: < 2.2e-16
```

a hypothesis test

hypothesis,

H0 : β1 = β2 = ⋯ = βp = 0

versus the alternative

Ha : at least one βj is non-zero

hypothesis test is performed by computing the F-statistic

This F-statistic = 535.8 on 1 that means it evidence against the null hypothesis H0. Or the large F-statistic suggests that at least one of the advertising media must be related to mpg.

I.Is there a relationship between the predictor and the response? Why?

Answer: Yes, b/c the coefficient for the predictor(horspower) is significantly differnt from zero. The “p-value” at B0 and B1 < 2.2e-16” < 0.05 (very small) or there is an association between the predictor and the response.

II. How strong is the relationship between the predictor and the response?

Answer: After checking at R square = 0.6 (not strong relationship between the mpg and hourspower(predictor and the response)) (if close to 1 that means strong relationship)

III. Is the relationship between the predictor and the response positive or negative?

Answer: Yes, b/c p value less than 0.05 (response negative)

IV What is the Predicted mpg with hoursepower of 98%

Answer: a housepower is giving 23.86675 of mpg or the predicted mpg for a horsepower of 98 is approximately 23.87.

```
predict_mpg = predict(model, data.frame(horsepower = 98))
predict_mpg
```

```
##        1
## 23.86675
```