

NOTE: This is the R session used to find the regression equation, confidence intervals and prediction intervals for the Highway sign distance by Age data. Lines that start with # are comments and not read by R. Lines that start with > are R commands. Lines that don't start with either of those are output produced by R.

```
> #Read in the data.
> #sep="\t" shows that the columns are separated with a tab.
> #header=F says there is no beginning line with variable names.
> Highway<-read.table("HighwaySign.txt", header=F, sep="\t",
col.names=c("Age", "Distance"))
```

```
> #Make sure it worked by printing out the first 6 lines:
> head(Highway)
  Age Distance
1  18      510
2  20      590
3  22      560
4  23      510
5  23      460
6  25      490
```

```
> #Create the regression model. Call it "HWMModel"
> HWMModel<-lm(Distance~Age,data=Highway)

> #See a summary of the model, including coefficients, etc.
> summary(HWMModel)
```

```
Call:
lm(formula = Distance ~ Age, data = Highway)
```

```
Residuals:
    Min       1Q   Median       3Q      Max
-78.231 -41.710   7.646  33.552 108.831
```

```
Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 576.6819    23.4709   24.570 < 2e-16 ***
Age         -3.0068     0.4243   -7.086 1.04e-07 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 49.76 on 28 degrees of freedom
Multiple R-squared:  0.642,    Adjusted R-squared:  0.6292
F-statistic: 50.21 on 1 and 28 DF,  p-value: 1.041e-07
```

```
> #Get 95% confidence intervals for the intercept and slope.
> confint(HWMModel)
```

```
                2.5 %      97.5 %
(Intercept) 528.604017 624.759857
Age         -3.876051  -2.137620
```

```
> #Get 95% confidence interval for the mean of Y's at X = 30.
> #se.fit=T includes value of the standard error in the output
> predict(HWMModel, list(Age=30),se.fit=T,interval="confidence")
$fit
```

```
      fit      lwr      upr
1 486.4769 460.4091 512.5447
```

```
$se.fit
[1] 12.72588
```

```
$df
[1] 28

$residual.scale
[1] 49.76158

> #Get 95% prediction interval for an individual Y when X = 30.
> predict(HWModel, list(Age=30),se.fit=T,interval="p")
$fit
      fit      lwr      upr
1 486.4769 381.2644 591.6893

$se.fit
[1] 12.72588

$df
[1] 28

$residual.scale
[1] 49.76158

> #Get confidence interval and prediction interval for Age = 50
> predict(HWModel, list(Age=50),se.fit=T,interval="confidence")
$fit
      fit      lwr      upr
1 426.3402 407.7097 444.9706

$se.fit
[1] 9.095085

$df
[1] 28

$residual.scale
[1] 49.76158

> predict(HWModel, list(Age=50),se.fit=T,interval="predict")
$fit
      fit      lwr      upr
1 426.3402 322.7196 529.9607

$se.fit
[1] 9.095085

$df
[1] 28

$residual.scale
[1] 49.76158

> #Quit R
> q()
```