

Linear Regression in R workshop

```
library("car")
library("caret")
library("gvlma")
library("predictmeans")
library("e1071")
library("lmtest")

#Predict happiness

## Testing Assumptions

### Test for Linearity

sca er.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Economy..GDP.per.Capita.) sca
er.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Family)

sca er.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Health..Life.Expectancy.)

sca er.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Freedom)

sca er.smooth(x=WorldHappiness$Happiness.Score,
y=WorldHappiness$Trust..Government.Corrup on.)

sca er.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Generosity)

sca er.smooth(x=WorldHappiness$Happiness.Score, y=WorldHappiness$Dystopia.Residual)

# The only ones that are linear are economy, dystopia, and generosity. Use those

### Homoscedasticity

lmMod <- lm(Happiness.Score~Economy..GDP.per.Capita. + Generosity, data=WorldHappiness)

par(mfrow=c(2,2))
plot(lmMod)

#### Shows approximately straight across for 2/3, but the other one isn't - you may have an outlier issue
- but you'll get to that later

lmtest::bptest(lmMod)

#### You want it to be nonsignificant, and it is, so you're good to go!

### Homogeneity of Variance
```

Good on that too per the plot, try the assumption library

```
gvlma(lmMod)
```

All assumptions acceptable. Wahoo!

Screening for Outliers

```
CookD(lmMod, group=NULL, plot=TRUE, idn=3, newwd=TRUE)
```

Outliers on row 129, 143, and 156

```
lev = hat(model.matrix(lmMod))  
plot(lev)
```

```
car::outlierTest(lmMod)
```

We have at least one outlier, the one that is 3 standard deviations away plus is row 156 (already showed on the other graph)

```
summary(influence.measures(lmMod))
```

Lots are outliers, but none in x and y space

Run the Model

```
summary(lmMod)
```