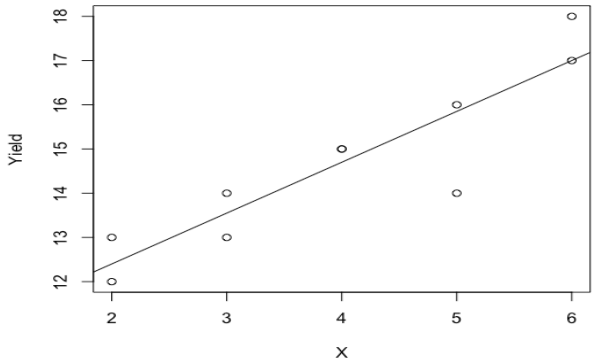
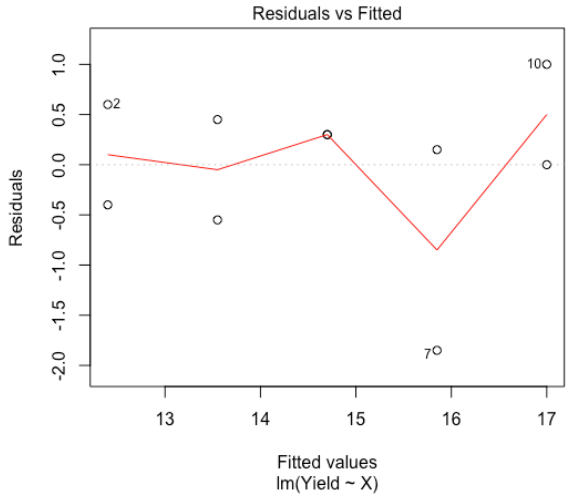
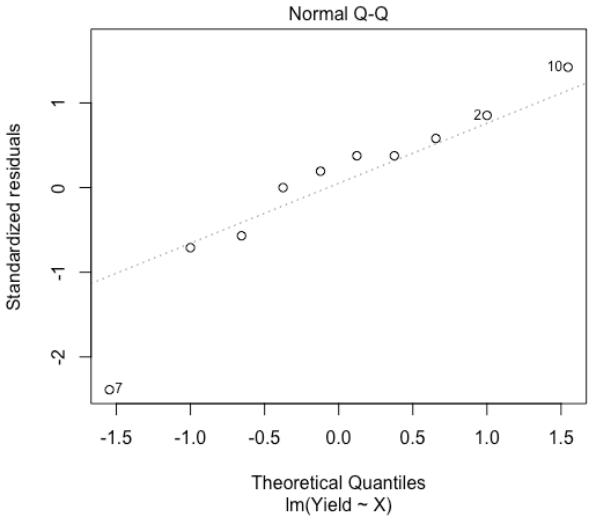
```
#Regression - Corn Example
#(Simple linear) regression is used to model the linear
relationship between
#a numerical response variable and a single numerical predictor.
#In this example, corn yield is the response and fertilizer (X)
is the predictor.

Corn <- read.csv("~/Dropbox/STAT512/Lectures/R_Stuff/Corn.csv")
str(Corn)
#Scatterplot
plot(Yield ~ X, data = Corn)
#Overlay fitted regression line
abline(lm(Yield ~ X, data = Corn))
#Regression
Fit <- lm(Yield ~ X, data = Corn)
Fit
summary(Fit)
#Confidence Intervals
confint(Fit, level = 0.95)
#Diagnostic plots
plot(Fit)
```

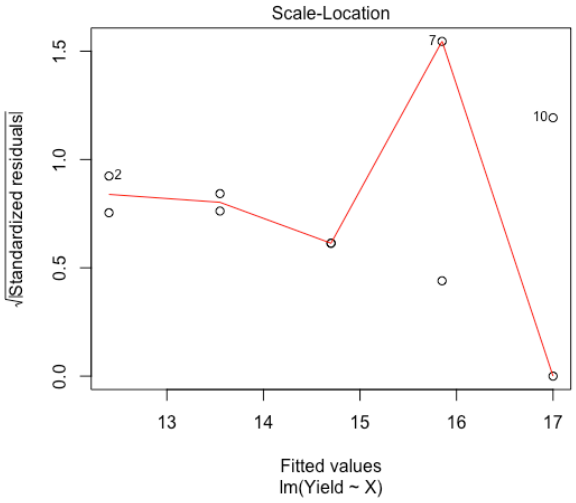
```
> Corn <-
read.csv("~/Dropbox/STAT512/Lectures/R_Stuff/Corn.csv")
> str(Corn)
'data.frame':  10 obs. of  2 variables:
 $ Yield: int  12 13 13 14 15 15 14 16 17 18
 $ X    : int  2 2 3 3 4 4 5 5 6 6
> #Scatterplot
> plot(Yield ~ X, data = Corn)
> #Overlay fitted regression line
> abline(lm(Yield ~ X, data = Corn))
```

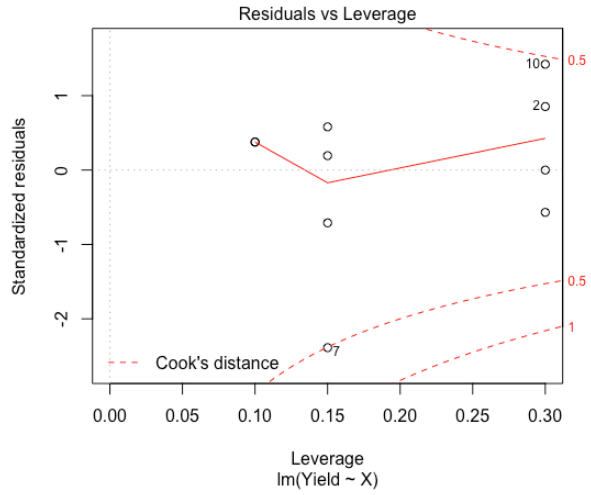


```
> #Regression
> Fit <- lm(Yield ~ X, data = Corn)
> Fit

Call:
lm(formula = Yield ~ X, data = Corn)

Coefficients:
(Intercept)            X
      10.10         1.15

> summary(Fit)

Call:
lm(formula = Yield ~ X, data = Corn)

Residuals:
    Min      1Q  Median      3Q     Max
-1.8500 -0.3000  0.2250  0.4125  1.0000

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  10.1000     0.7973   12.67 1.42e-06 ***
X             1.1500     0.1879    6.12 0.000283 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.8404 on 8 degrees of freedom
Multiple R-squared:  0.824,   Adjusted R-squared:  0.802
F-statistic: 37.45 on 1 and 8 DF,  p-value: 0.0002832

> #Confidence Intervals
> confint(Fit, level = 0.95)
                2.5 %    97.5 %
(Intercept) 8.2615130 11.938487
X           0.7166645  1.583336
> #Diagnostic plots
> plot(Fit)
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:
Hit <Return> to see next plot:
```


Residuals vs Fitted
Residuals
Fitted values
lm(Yield ~ X)
10
2
7


Normal Q-Q
Standardized residuals
Theoretical Quantiles
lm(Yield ~ X)
10
2
7


Scale-Location
√|Standardized residuals|
Fitted values
lm(Yield ~ X)
7
10
2


Residuals vs Leverage
Standardized residuals
Leverage
lm(Yield ~ X)
Cook's distance
0.5
1
10
2
7