```
# Math 3080 - 1   Treibergs   Feb. 22
#
# Plastic Data from Rosenkrantz, p. 431
# From R. Irwin, Linear Statistical Models(1985)
#
# Twelve batches of plastic were made. Molded items
# from each batch were tested for Brinell hardness  y  at
# time  x.
"x"   "y"
32   230
48   262
72   323
64   298
48   255
16   199
40   248
48   279
48   267
24   214
80   359
56   305
```

```
R version 2.7.2 (2008-08-25)
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  Natural language support but running in an English locale

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Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> tt <- read.table("M3081DataPlastic.txt", header=TRUE)
```
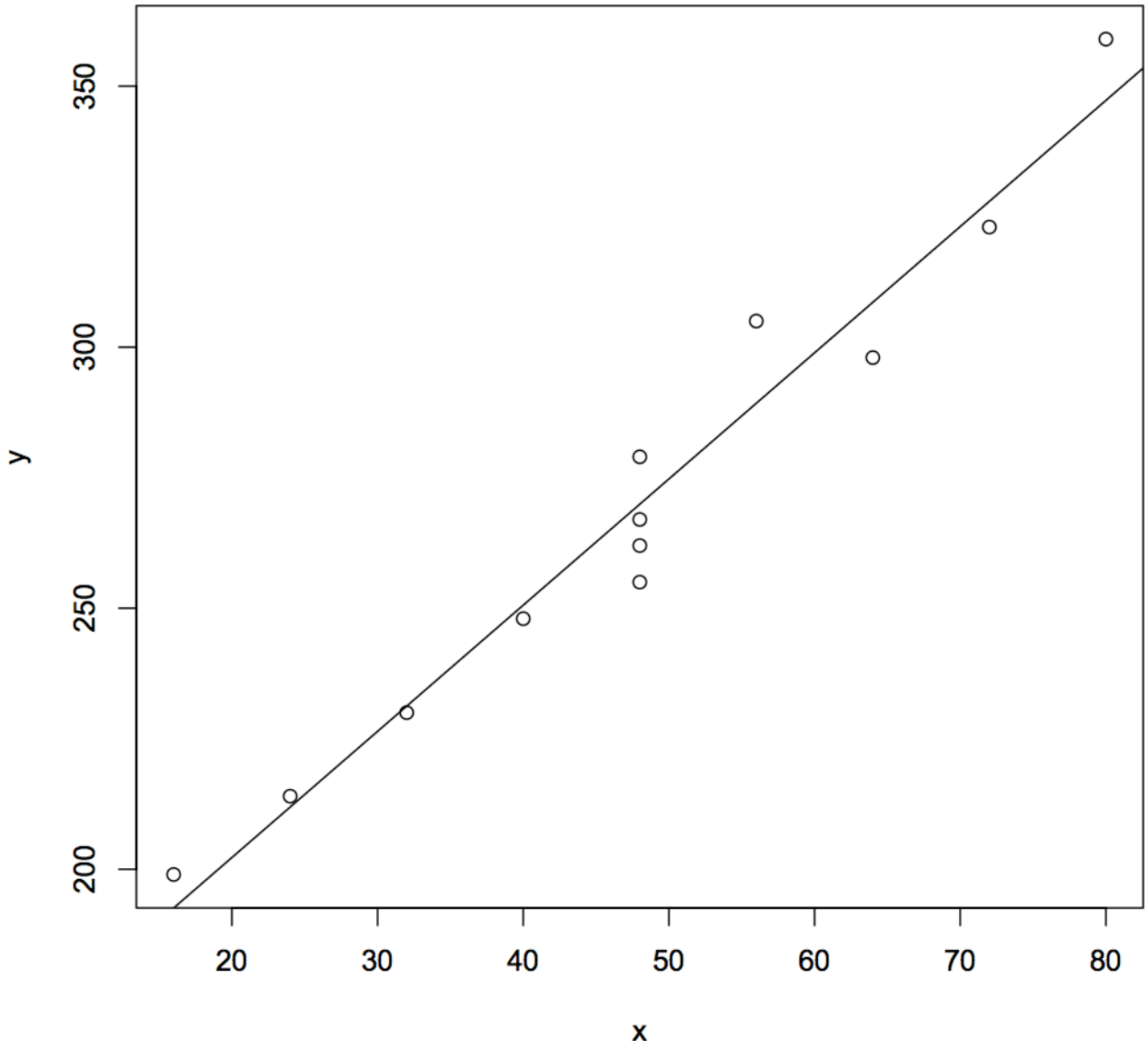
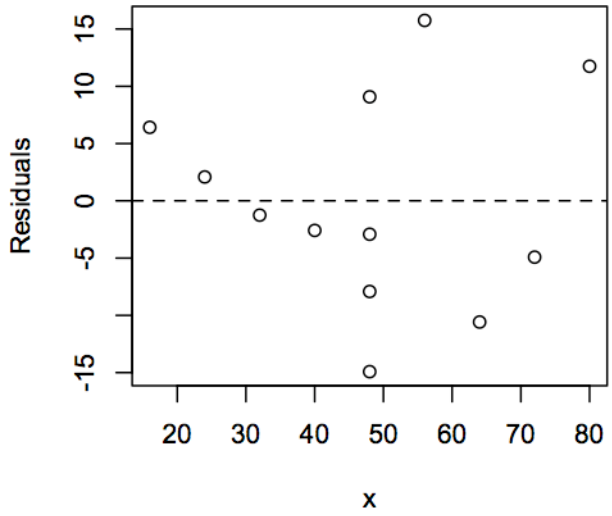
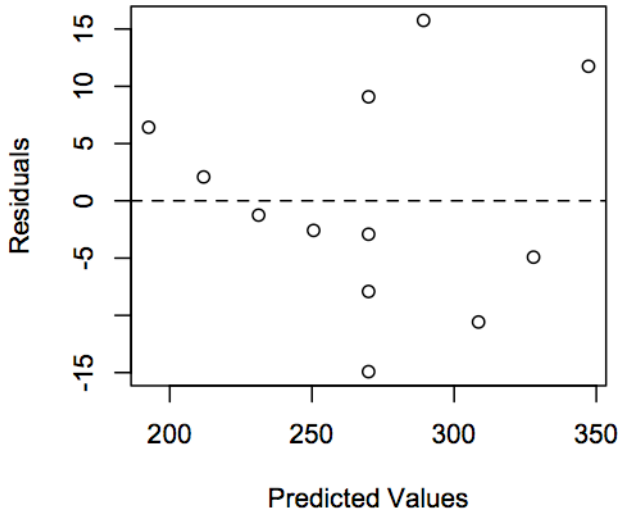
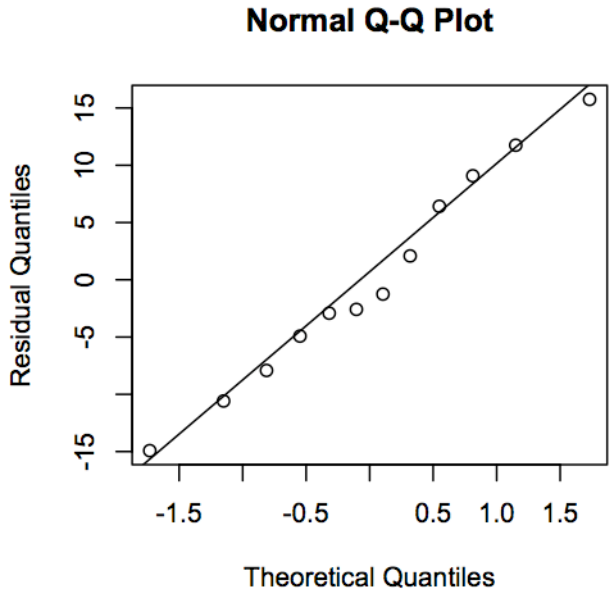

```
> tt

    x   y
1  32 230
2  48 262
3  72 323
4  64 298
5  48 255
6  16 199
7  40 248
8  48 279
9  48 267
10 24 214
11 80 359
12 56 305
> attach(tt)

> f <- lm(y ~ x); summary(f); anova(f)

Call:
lm(formula = y ~ x)

Residuals:
    Min      1Q  Median      3Q     Max
-14.917  -5.667  -1.917   7.083  15.750

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 153.9167     8.0666   19.08 3.40e-09 ***
x             2.4167     0.1575   15.35 2.81e-08 ***
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1

Residual standard error: 9.758 on 10 degrees of freedom
Multiple R-squared: 0.9593,Adjusted R-squared: 0.9552
F-statistic: 235.5 on 1 and 10 DF,  p-value: 2.807e-08

Analysis of Variance Table

Response: y
          Df  Sum Sq Mean Sq F value    Pr(>F)
x          1 22426.7 22426.7  235.51 2.807e-08 ***
Residuals 10   952.3    95.2
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1
```

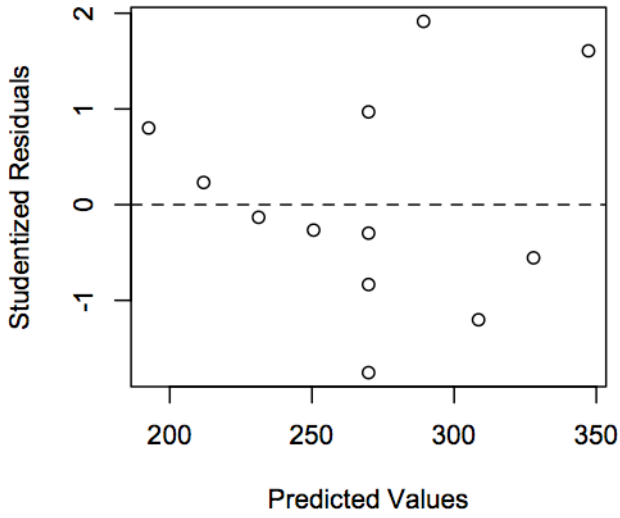
```
> plot(y~x); abline(f)

> eps <- residuals(f)
> yhat <- fitted(f)
> studenteps <- rstudent(f)

> layout(matrix(1:4, ncol=2))
> plot(x,eps,ylab="Residuals"); abline(h=0, lty=2)
> qqnorm(eps,ylab="Residual Quantiles"); qqline(eps)
> plot(yhat,eps,ylab="Residuals",xlab="Predicted Values"); abline(h=0,lty=2)
> plot(yhat,studenteps,ylab="Studentized Residuals",
+  xlab="Predicted Values"); abline(h=0,lty=2)
```


y
x
200
250
300
350
20
30
40
50
60
70
80


Residuals
15
10
5
0
-5
-15
20
30
40
50
60
70
80
x


Residuals
15
10
5
0
-5
-15
200
250
300
350
Predicted Values


Normal Q-Q Plot
Residual Quantiles
15
10
5
0
-5
-15
-1.5
-0.5
0.5
1.0
1.5
Theoretical Quantiles


Studentized Residuals
2
1
0
-1
200
250
300
350
Predicted Values