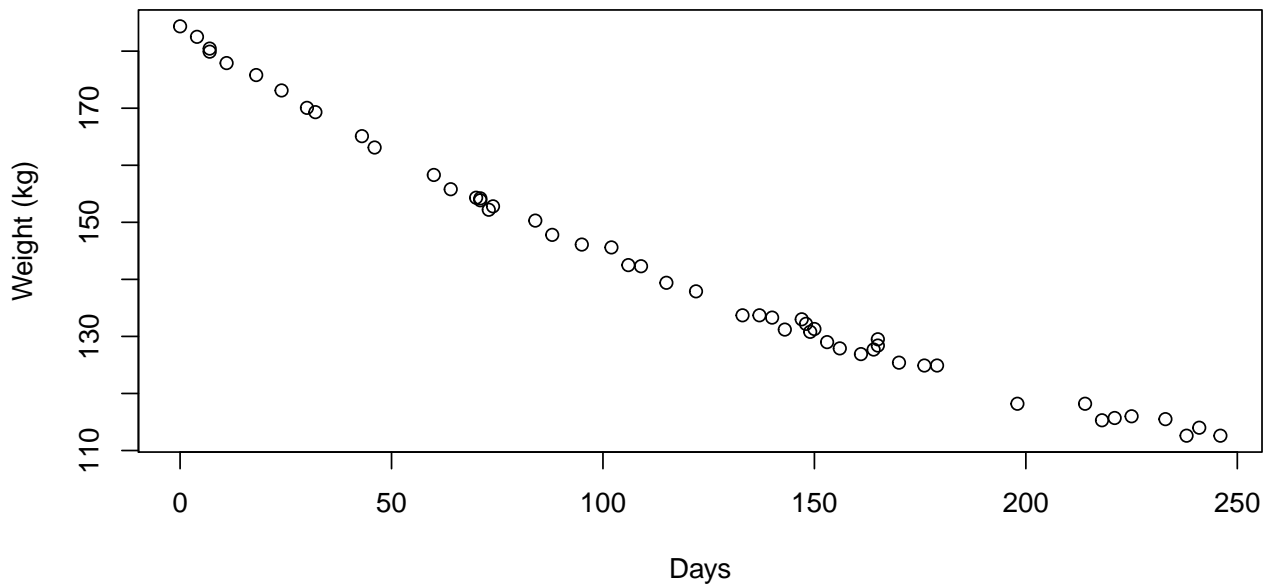


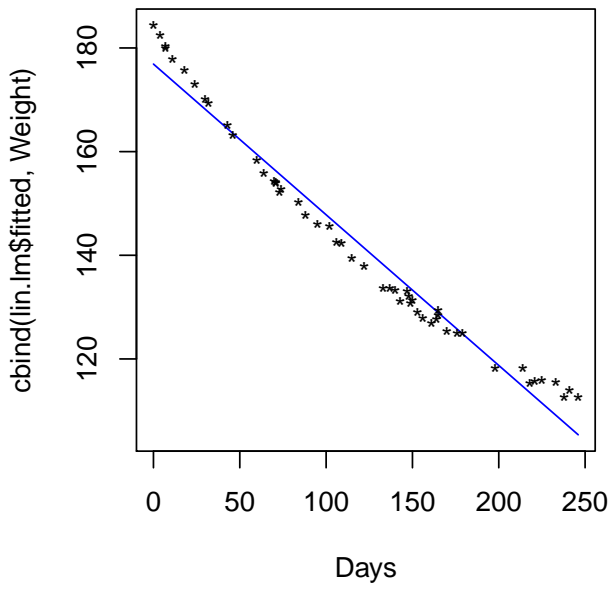
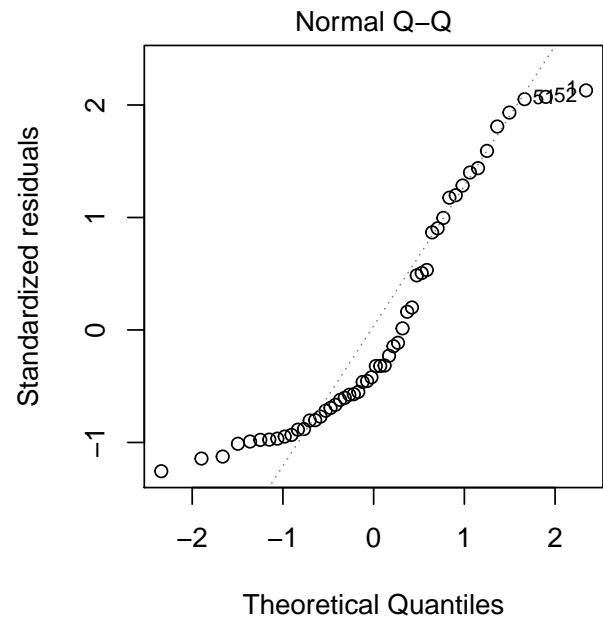
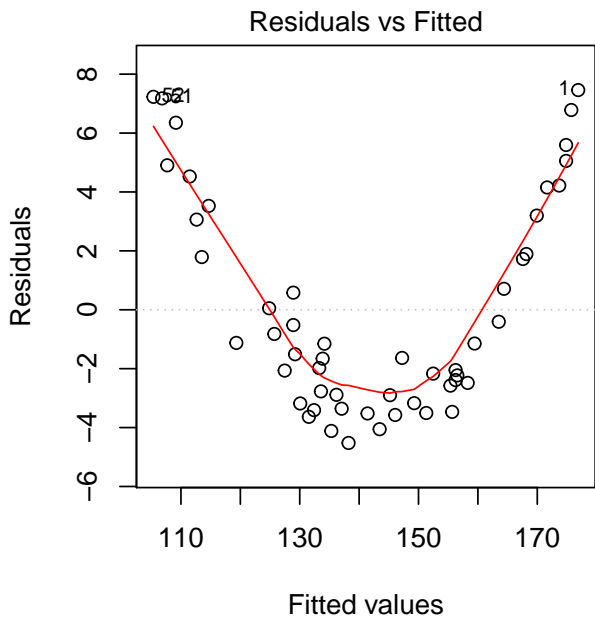
Polynomial regression

The data gives the weight, in kilograms, of an obese patient at 52 time points over an 8 month period of a weight rehabilitation programme.

Linear model



```
##
## Call:
## lm(formula = Weight ~ Days, model = T)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -4.522  -2.891  -1.331   3.096   7.460
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 176.890244  0.987644   179.1  <2e-16 ***
## Days        -0.290735  0.007125   -40.8  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.639 on 50 degrees of freedom
## Multiple R-squared:  0.9708, Adjusted R-squared:  0.9703
## F-statistic: 1665 on 1 and 50 DF,  p-value: < 2.2e-16
```



Forward selection w.r.t. F -test (t -test)

```
## Analysis of Variance Table
##
## Model 1: Weight ~ Days
## Model 2: Weight ~ Days + I(Days^2)
## Model 3: Weight ~ Days + I(Days^2) + I(Days^3)
## Model 4: Weight ~ Days + I(Days^2) + I(Days^3) + I(Days^4)
##   Res.Df    RSS Df Sum of Sq      F Pr(>F)
## 1      50 662.14
## 2      49  43.17  1    618.98 759.3607 < 2e-16 ***
## 3      48  39.23  1     3.93  4.8223 0.03306 *
## 4      47  38.31  1     0.92  1.1328 0.29261
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Forward selection w.r.t. AIC

```
##           Step Df   Deviance Resid. Df Resid. Dev      AIC
## 1                NA         NA      50  662.14039 136.300162
## 2 + I(Days^2)  -1  618.975207      49   43.16518  -3.682898
## 3 + I(Days^3)  -1    3.930809      48   39.23437  -6.647909
```

Cubic model

```
##  
## Call:  
## lm(formula = Weight ~ Days + I(Days^2) + I(Days^3), model = T)  
##  
## Residuals:  
##      Min      1Q   Median      3Q      Max  
## -2.18223 -0.60311  0.00146  0.49090  2.33690  
##  
## Coefficients:  
##              Estimate Std. Error t value Pr(>|t|)  
## (Intercept)  1.839e+02  4.219e-01  435.809 < 2e-16 ***  
## Days        -4.881e-01  1.570e-02 -31.094 < 2e-16 ***  
## I(Days^2)    1.022e-03  1.520e-04   6.721 1.97e-08 ***  
## I(Days^3)   -8.909e-07  4.062e-07  -2.193  0.0332 *  
## ---  
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
##  
## Residual standard error: 0.9041 on 48 degrees of freedom  
## Multiple R-squared:  0.9983, Adjusted R-squared:  0.9982  
## F-statistic:  9246 on 3 and 48 DF,  p-value: < 2.2e-16  
##  
## Correlation of Coefficients:  
##              (Intercept) Days  I(Days^2)  
## Days          -0.81  
## I(Days^2)     0.68          -0.97  
## I(Days^3)    -0.59          0.92 -0.99
```

