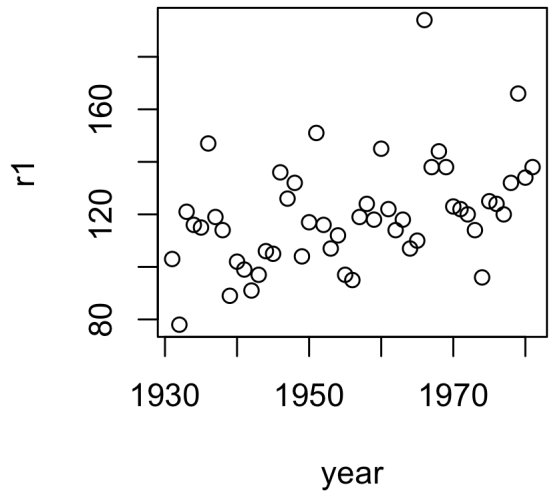
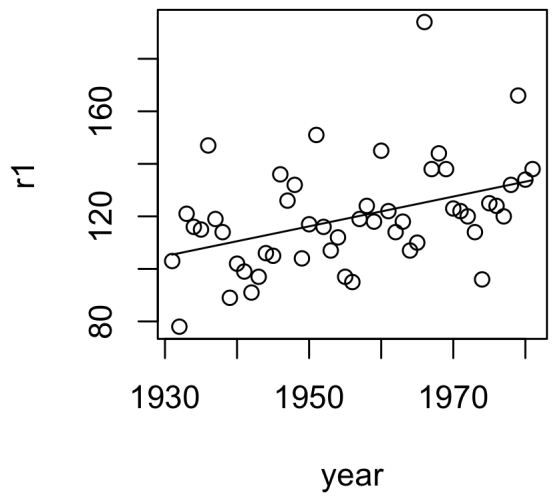
```
##############################################
Venice data
##############################################

> year = 1931:1981
> r1 = scan()   ##
1: 103 78 121 116 115 147 119 114 89 102 99 91 97 106 105 136 126 132
104 117 151 116 107 112 97 95 119 124 118 145 122 114 118 107 110 194
138 144 138 123 122 120 114 96 125 124 120 132 166 134 138
52:
Read 51 items

> venice  = data.frame(cbind(year,r1)) ##

> venice[1:3,]
  year  r1
1 1931 103
2 1932  78
3 1933 121

> attach(venice) ##
> plot(year,r1)
```

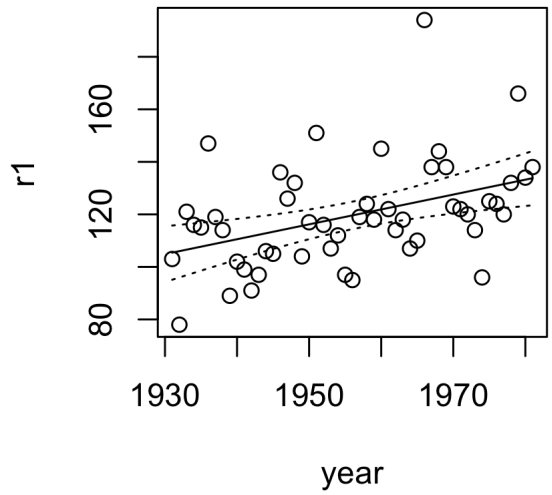



```
> lm(r1 ~ year)

Call:
lm(formula = r1 ~ year)
```

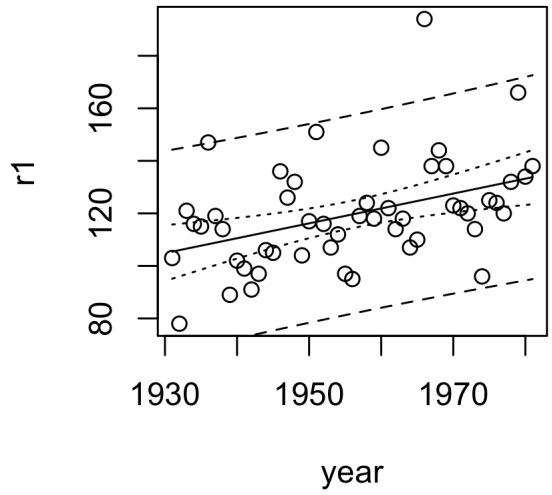
```
Coefficients:
(Intercept)         year
   -989.382        0.567

> lm(r1 ~ year - mean(year))  ##
Error in model.frame.default(formula = r1 ~ year - mean(year),
drop.unused.levels = TRUE) :
  variable lengths differ (found for 'mean(year)')   ###
> lm(r1 ~ I(year - mean(year)))

Call:
lm(formula = r1 ~ I(year - mean(year)))

Coefficients:
         (Intercept)  I(year - mean(year))
             119.608                 0.567

> vcov(.Last.value) ###
                       (Intercept) I(year - mean(year))
(Intercept)           6.797959e+00        -1.560851e-17
I(year - mean(year)) -1.560851e-17         3.137520e-02
> sqrt(diag(.Last.value))  ###
         (Intercept) I(year - mean(year))
           2.6072896            0.1771305
> anova(lm(formula = r1 ~ I(year - mean(year))))  ###
Analysis of Variance Table

Response: r1
                     Df  Sum Sq Mean Sq F value   Pr(>F)
I(year - mean(year))  1  3552.1  3552.1  10.245 0.002406
Residuals            49 16988.1   346.7

I(year - mean(year)) **
Residuals
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

> venice.lm = lm(formula = r1 ~ I(year - mean(year)))  ###

> lines(year,venice.lm$fitted.values)  ####
```




```
> venice.est = predict.lm(venice.lm,interval="confidence") ###
> venice.est
        fit       lwr      upr
1  105.4336  95.10679 115.7605
2  106.0006  95.97887 116.0223
3  106.5676  96.84749 116.2877
4  107.1345  97.71232 116.5568
5  107.7015  98.57299 116.8300
6  108.2685  99.42908 117.1079
7  108.8354 100.28013 117.3908

###  stuff omitted

> venice.est = predict.lm(venice.lm,interval="confidence")
> lines(year,venice.est[,2],lty=3)
> lines(year,venice.est[,3],lty=3)
```




```
> venice.pred = predict.lm(venice.lm,interval="prediction")
Warning message:
In predict.lm(venice.lm, interval = "prediction") :
  Predictions on current data refer to _future_ responses

> lines(year,venice.pred[,2],lty=2)
> lines(year,venice.pred[,3],lty=2)
```




```
> detach(venice)
```