Crime Reduction thoughts

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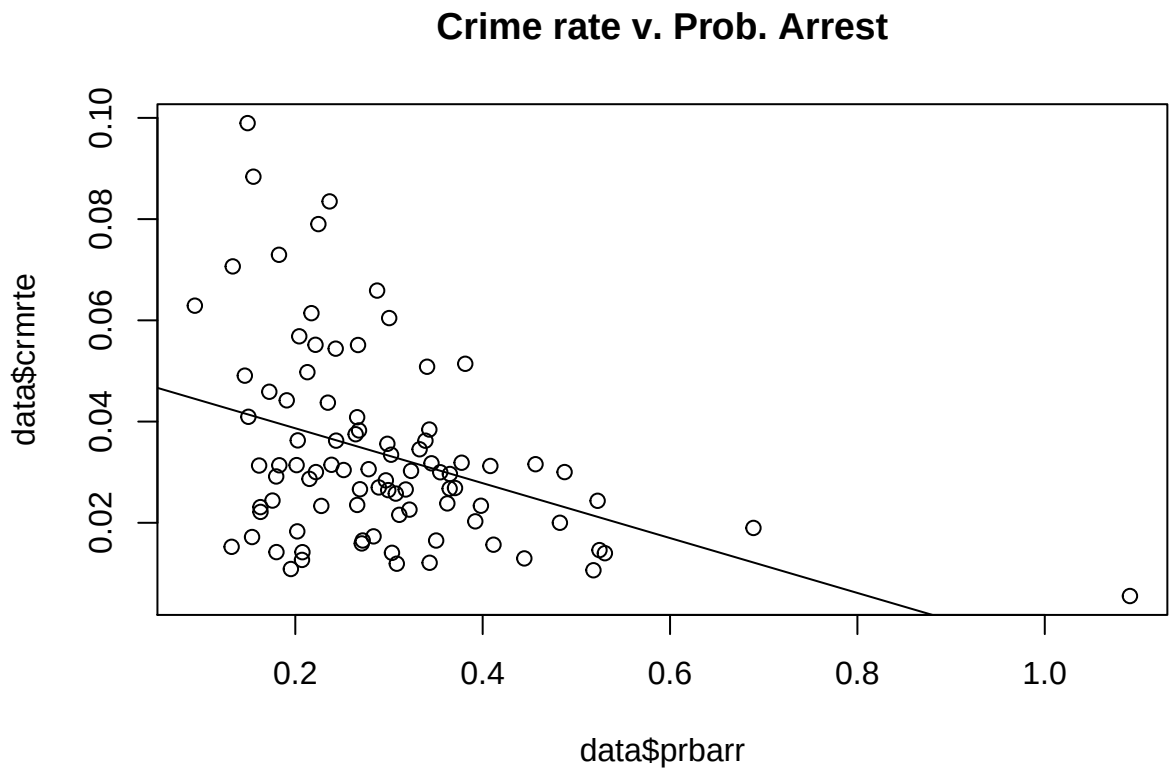
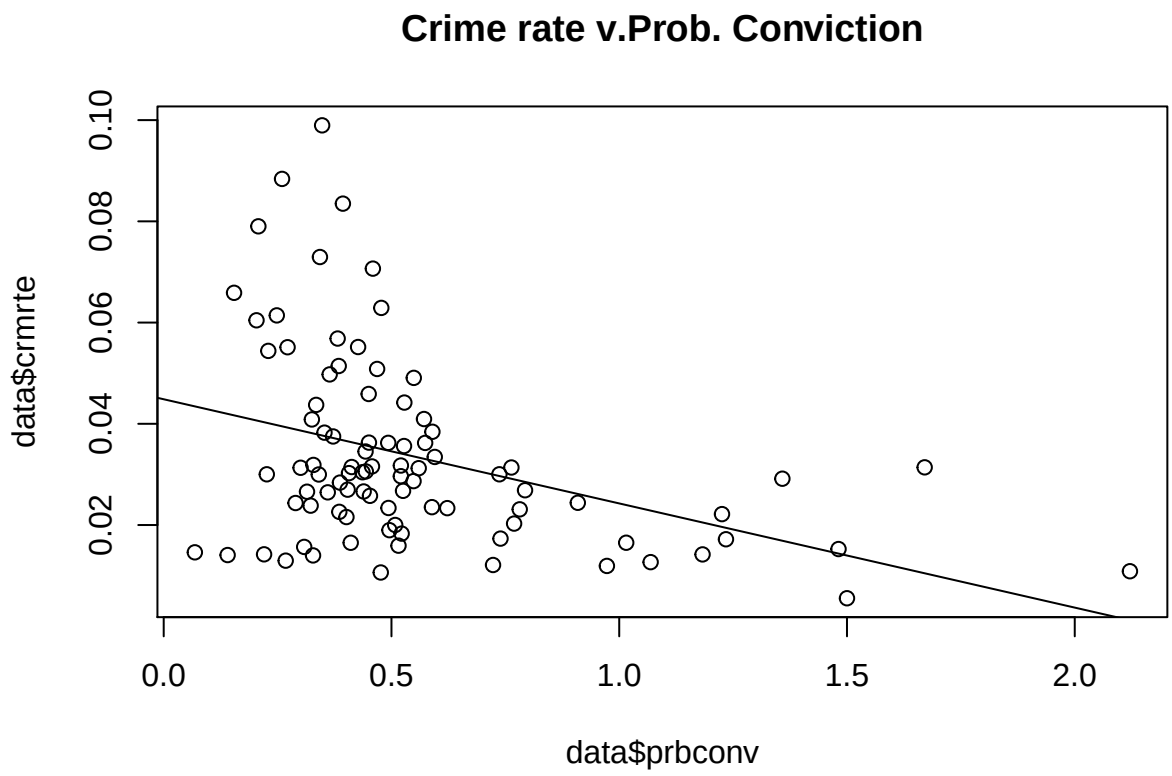
```
data = read.csv("crime.csv")
#View(data)
```

I wanted to look more closely at the bivariate relationships between crime rate and those variables that correlate with crimerate. . . .just to see if the relationships look linear.

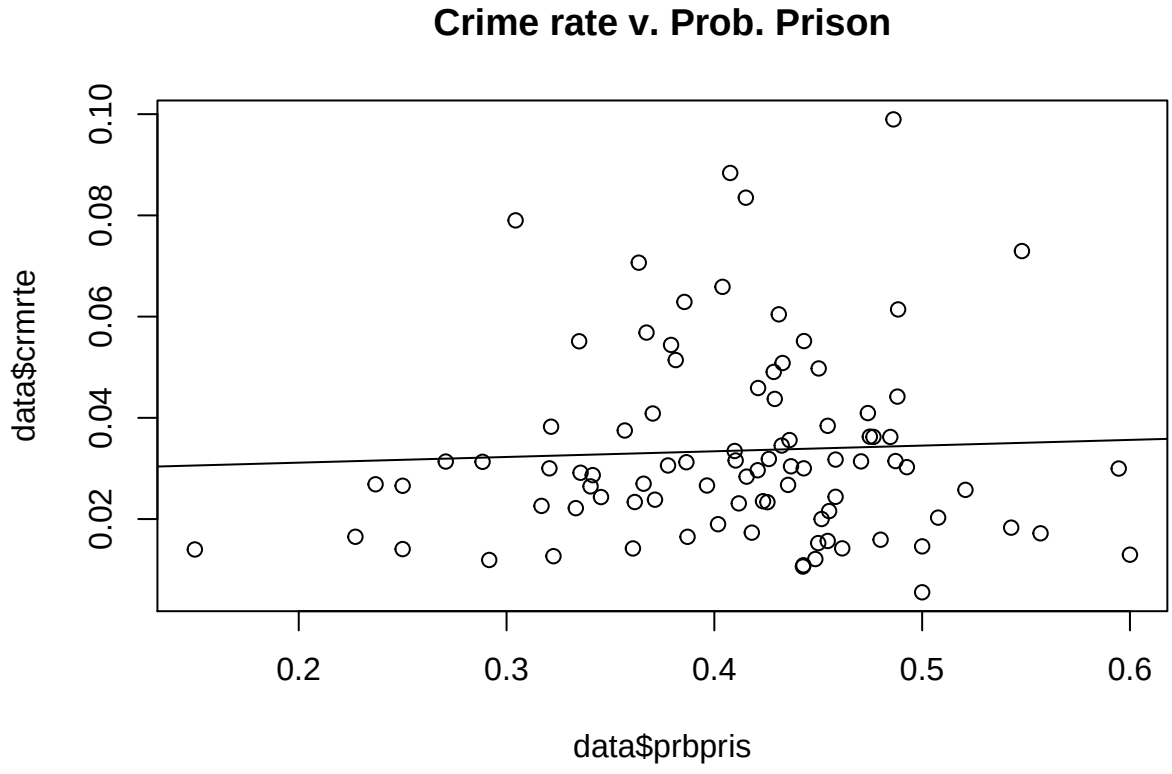
```
plot(data$prbarr,data$crmrte, main="Crime rate v. Prob. Arrest")
abline(lm(data$crmrte ~ data$prbarr))
```



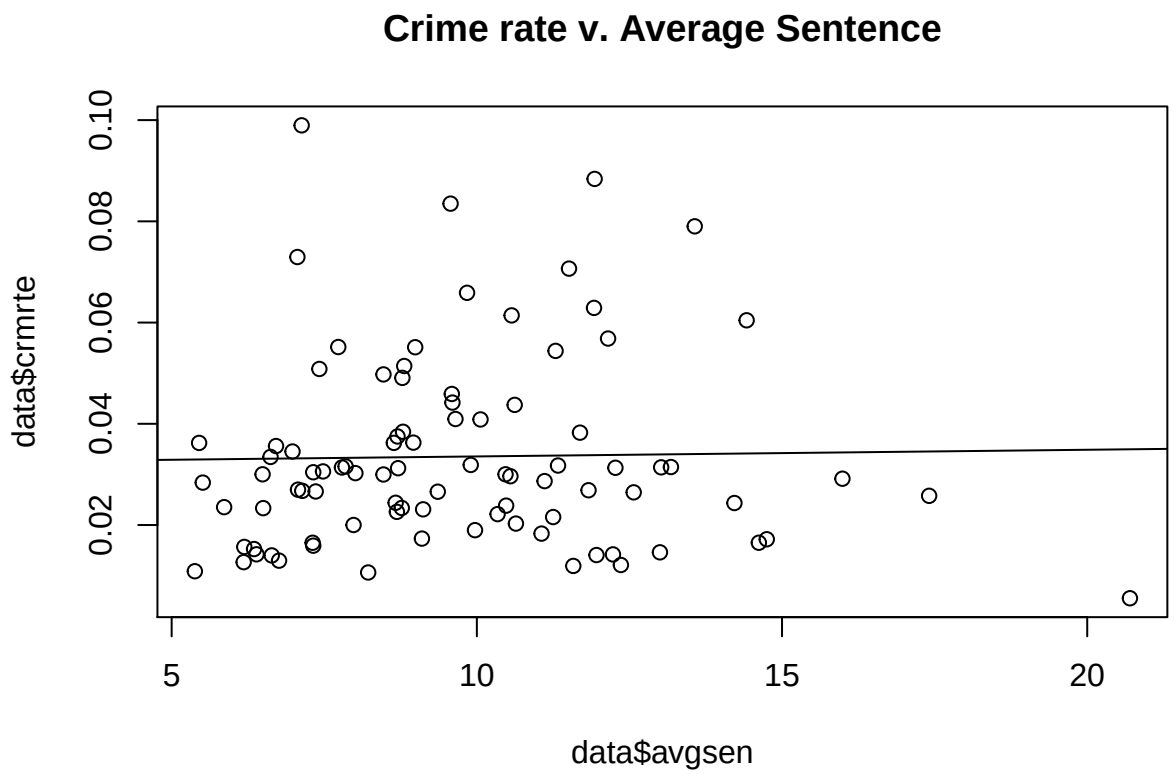

```
plot(data$prbconv,data$crmrte, main="Crime rate v.Prob. Conviction")
abline(lm(data$crmrte ~ data$prbconv))
```



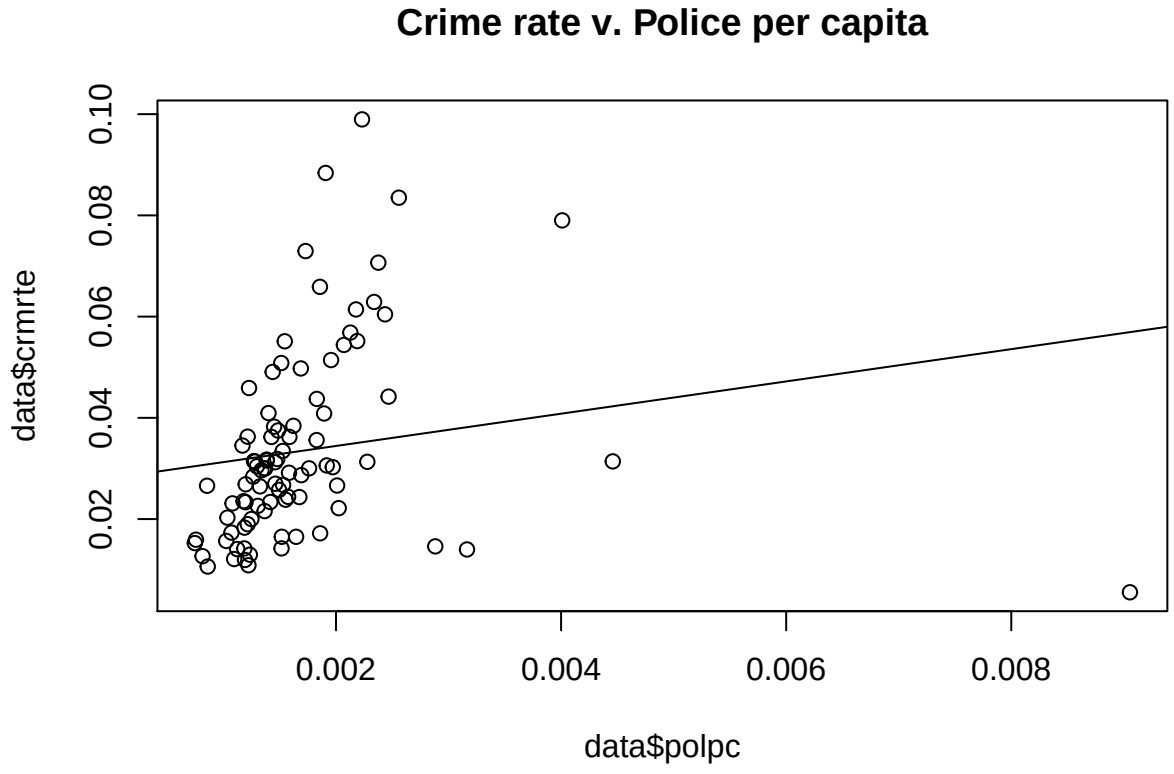

```
plot(data$prbpris,data$crmrte, main="Crime rate v. Prob. Prison")
abline(lm(data$crmrte ~ data$prbpris))
```




```
plot(data$avgsen,data$crmrte, main="Crime rate v. Average Sentence")
abline(lm(data$crmrte ~ data$avgsen))
```



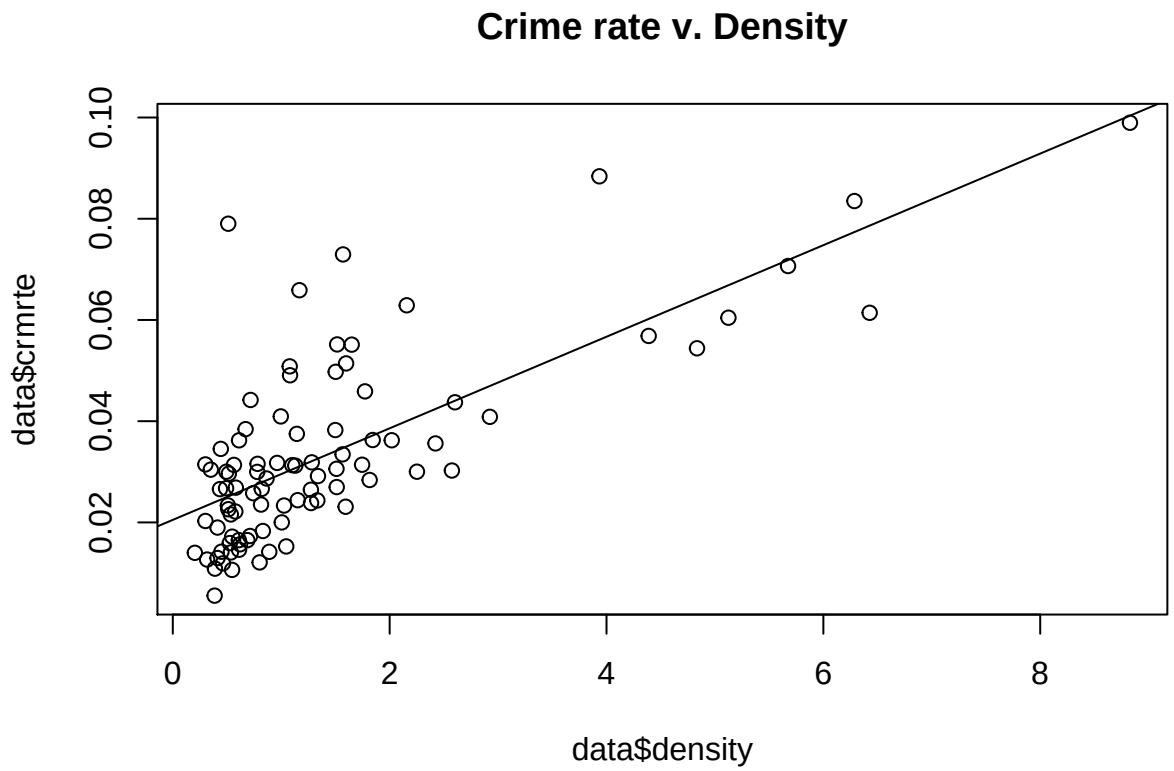

```
plot(data$polpc,data$crmrte, main="Crime rate v. Police per capita")
abline(lm(data$crmrte ~ data$polpc))
```



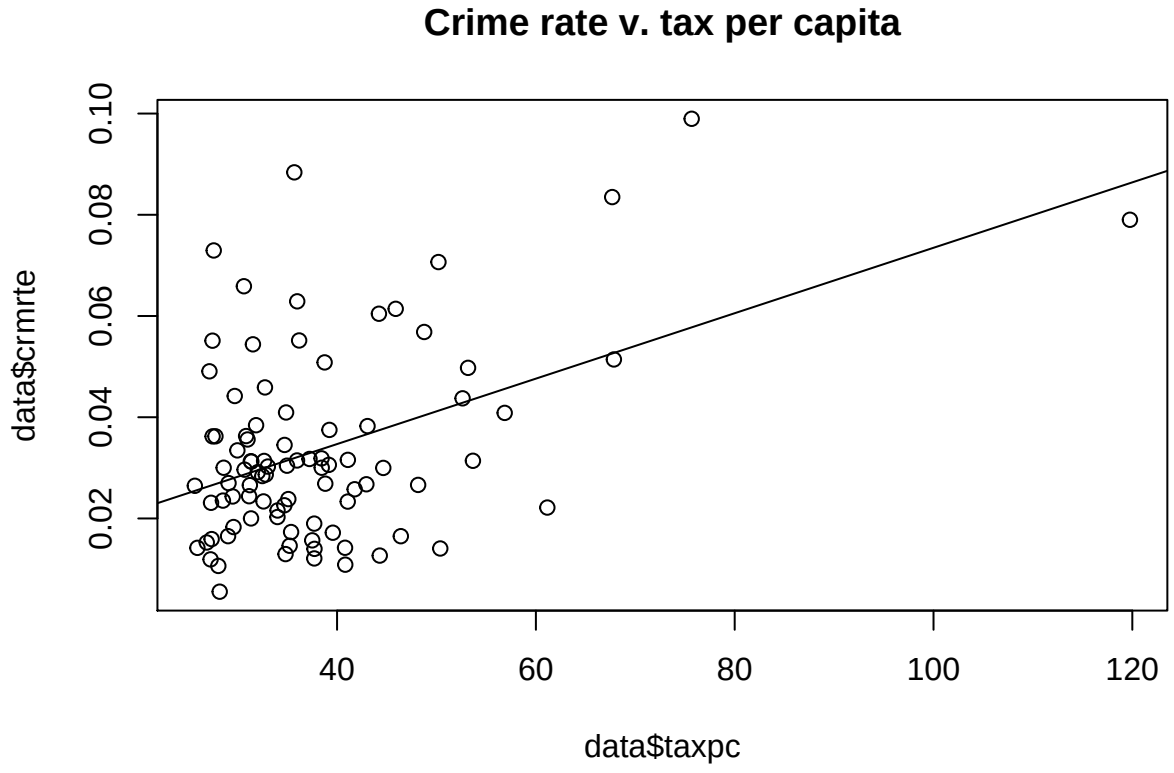

```
cor(data$crmrte,data$polpc )
```

```
## [1] 0.1672816
```

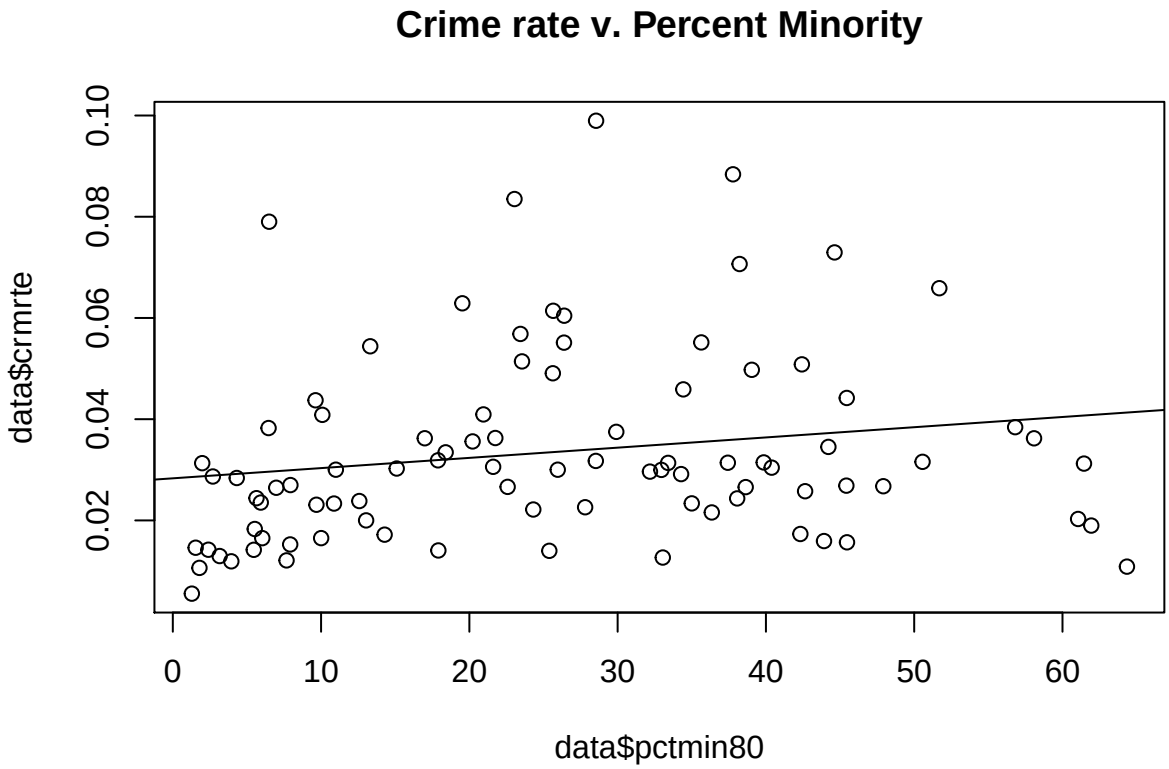
```
plot(data$density,data$crmrte, main="Crime rate v. Density")
abline(lm(data$crmrte ~ data$density))
```




```
plot(data$taxpc,data$crmrte, main="Crime rate v. tax per capita")
abline(lm(data$crmrte ~ data$taxpc))
```



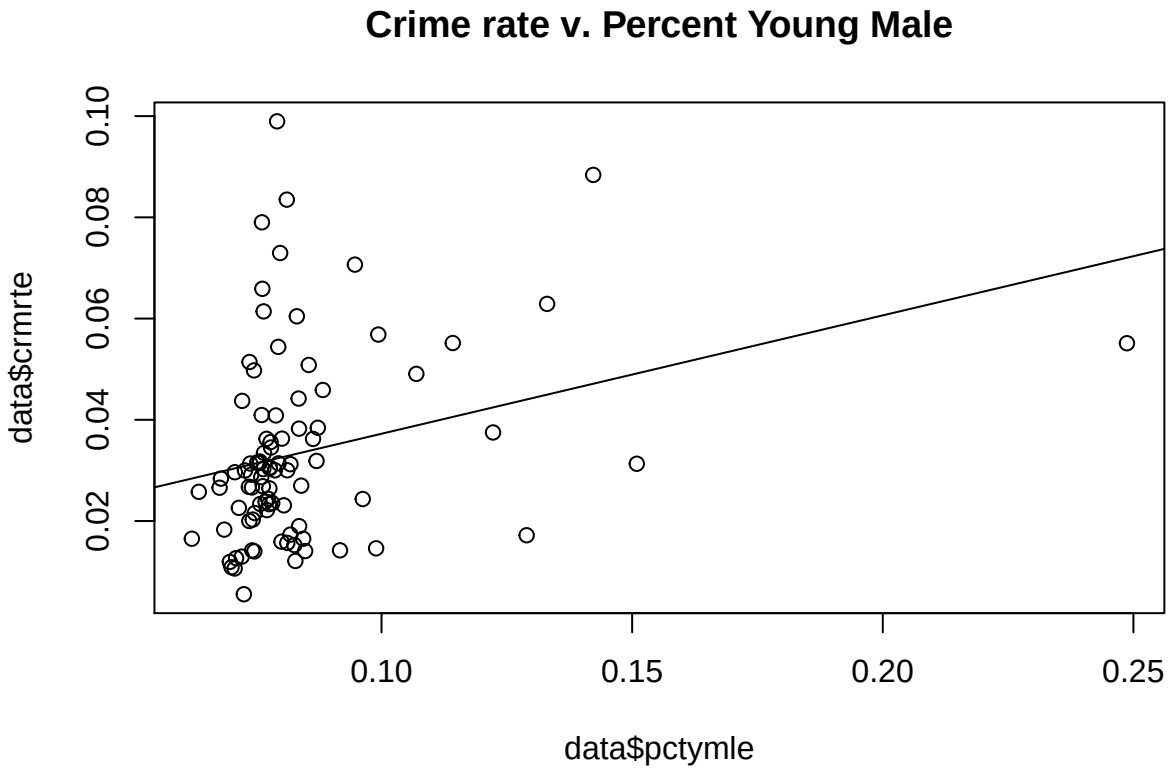
```
plot(data$pctmin80,data$crmrte, main="Crime rate v. Percent Minority")
abline(lm(data$crmrte ~ data$pctmin80))
```




```
cor(data$crmrte,data$pctmin80 )
```

```
## [1] 0.1816506
```

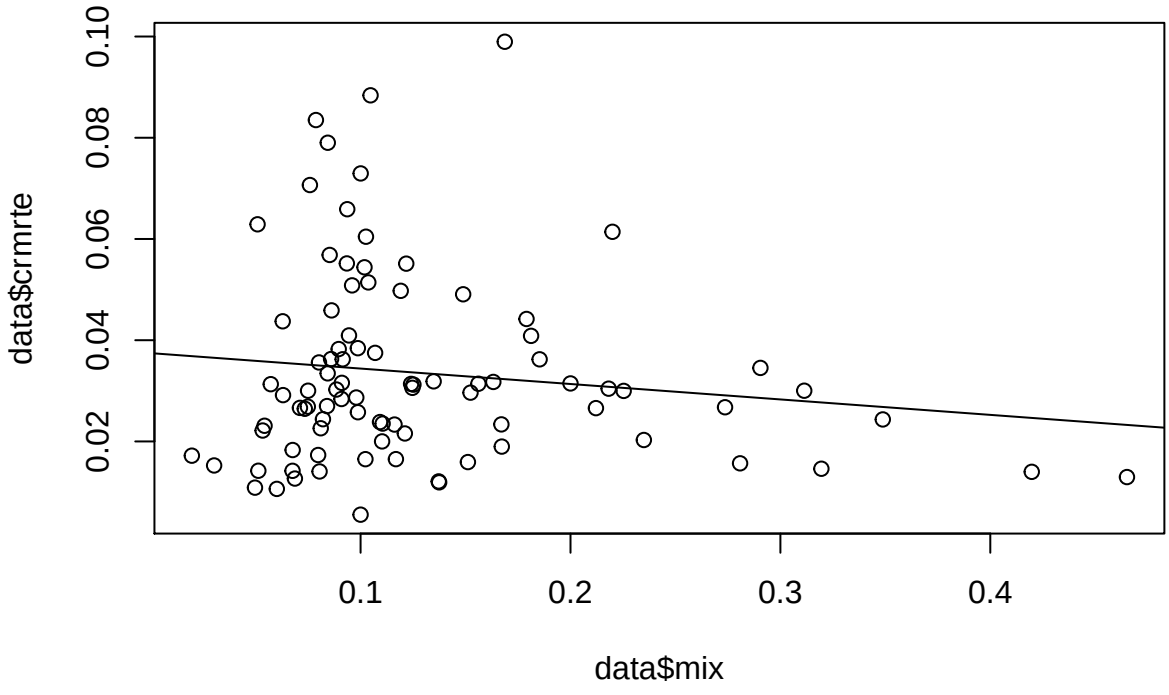
```
plot(data$pctymle,data$crmrte, main="Crime rate v. Percent Young Male")
abline(lm(data$crmrte ~ data$pctymle))
```




```
cor(data$crmrte,data$pctymle )
```

```
## [1] 0.2903397
```

```
plot(data$mix,data$crmrte, main="Crime rate v. Offense Mix")
abline(lm(data$crmrte ~ data$mix))
```



```r
cor(data$crmrte,data$mix )
```

```
## [1] -0.1320004
```

```r
library(car)
library(corrplot)
library(lmtest)
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```r
library(sandwich)
library(stargazer)
```

```
##
## Please cite as:
```

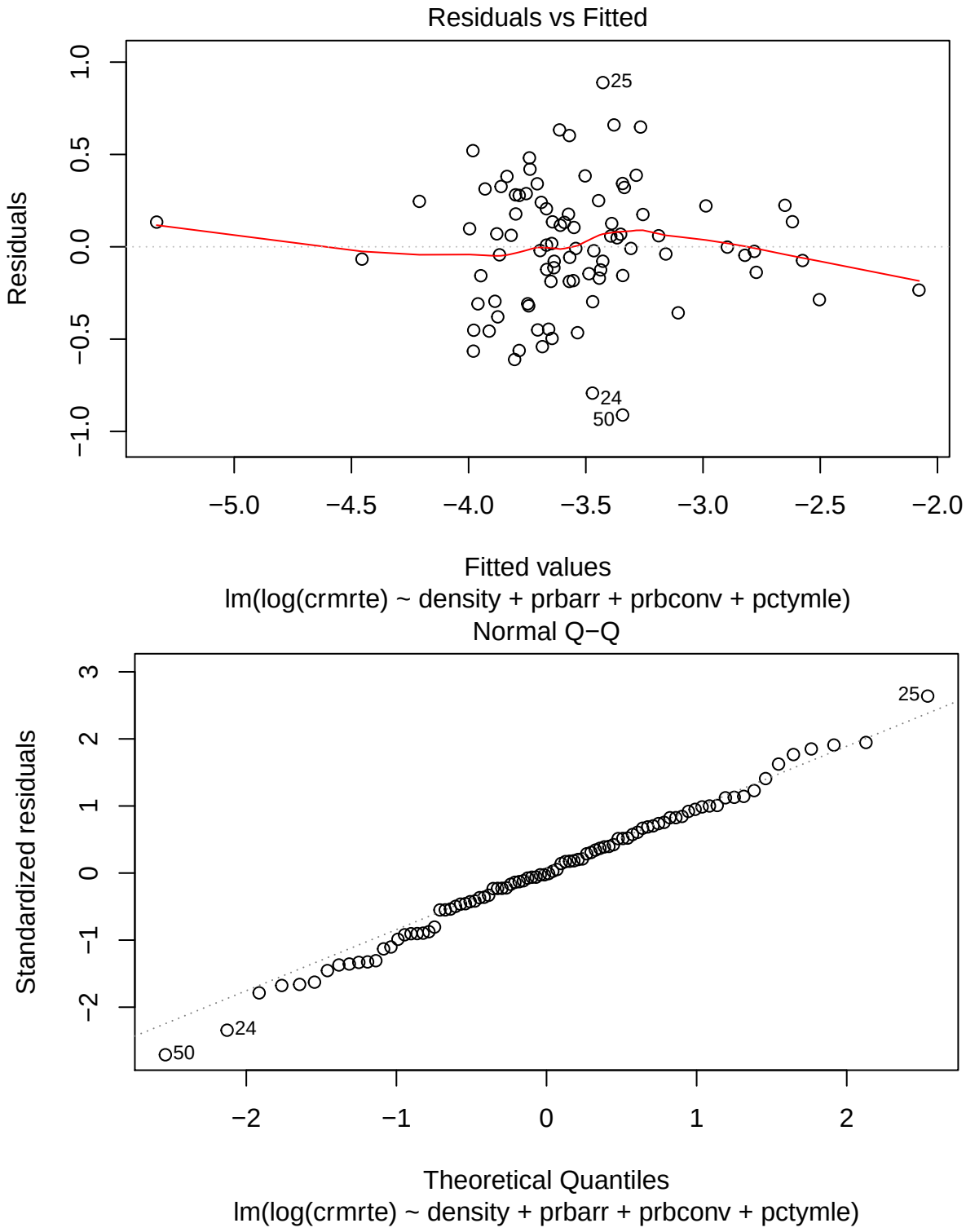
```
##  Hlavac, Marek (2015). stargazer: Well-Formatted Regression and Summary Statistics Tables.
```

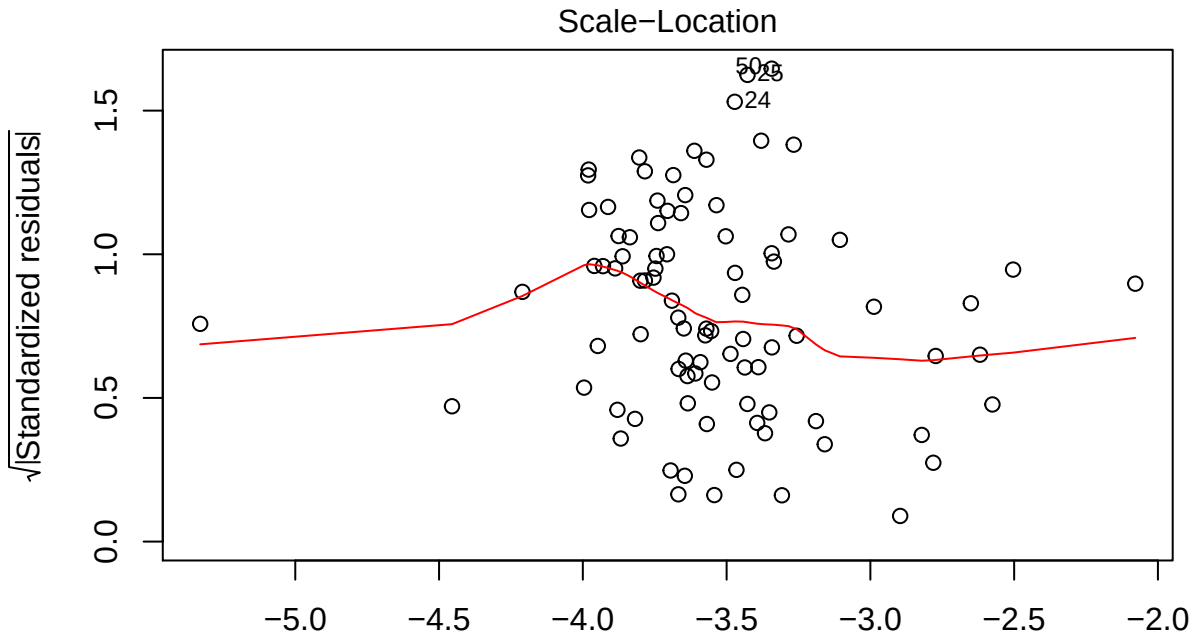
```
##  R package version 5.2. http://CRAN.R-project.org/package=stargazer
```

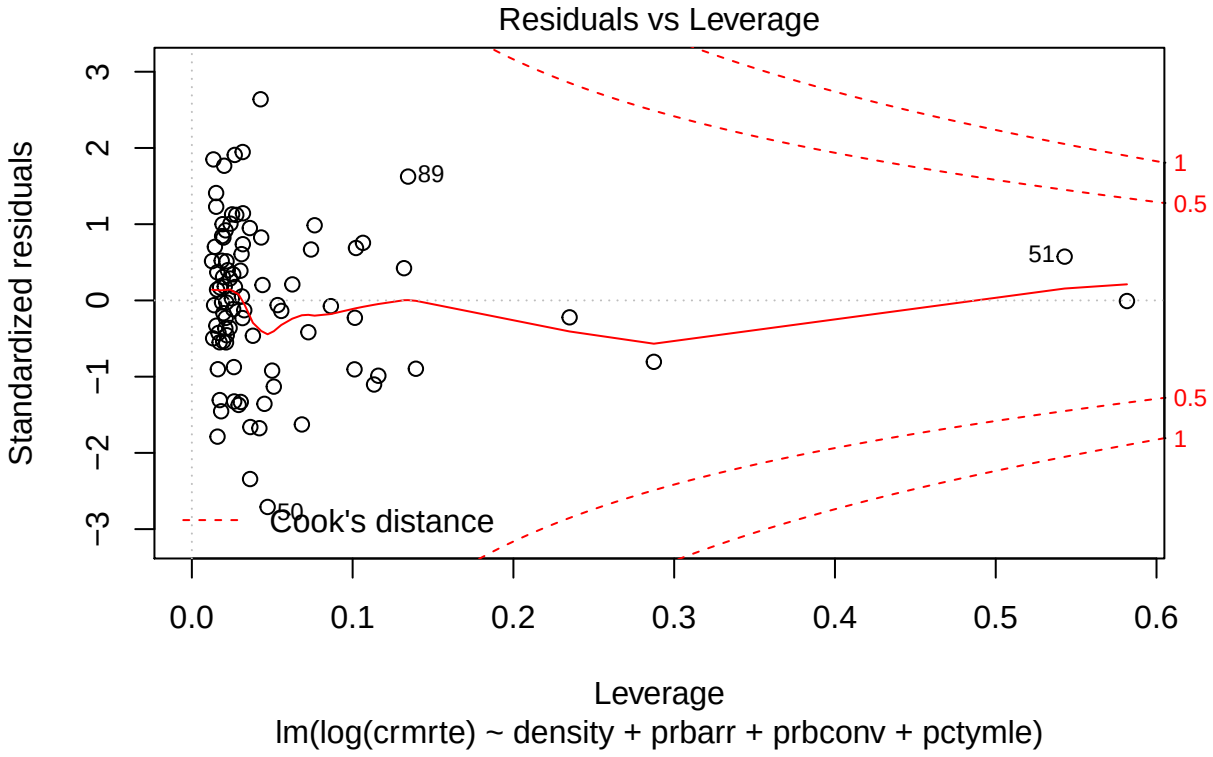
```r
model1 = lm(log(crmrte) ~ density+prbarr +prbconv+ pctymle, data = data)
summary(model1)
```

```
##
## Call:
## lm(formula = log(crmrte) ~ density + prbarr + prbconv + pctymle,
##     data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.91089 -0.18643 -0.00531  0.22374  0.88917
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -3.28626    0.20688 -15.885  < 2e-16 ***
## density      0.15797    0.02607   6.059 3.62e-08 ***
## prbarr      -1.35869    0.28506  -4.766 7.67e-06 ***
## prbconv     -0.53966    0.10831  -4.983 3.26e-06 ***
## pctymle      2.56831    1.60841   1.597    0.114
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3444 on 85 degrees of freedom
## Multiple R-squared:  0.6237, Adjusted R-squared:  0.606
## F-statistic: 35.22 on 4 and 85 DF,  p-value: < 2.2e-16
```

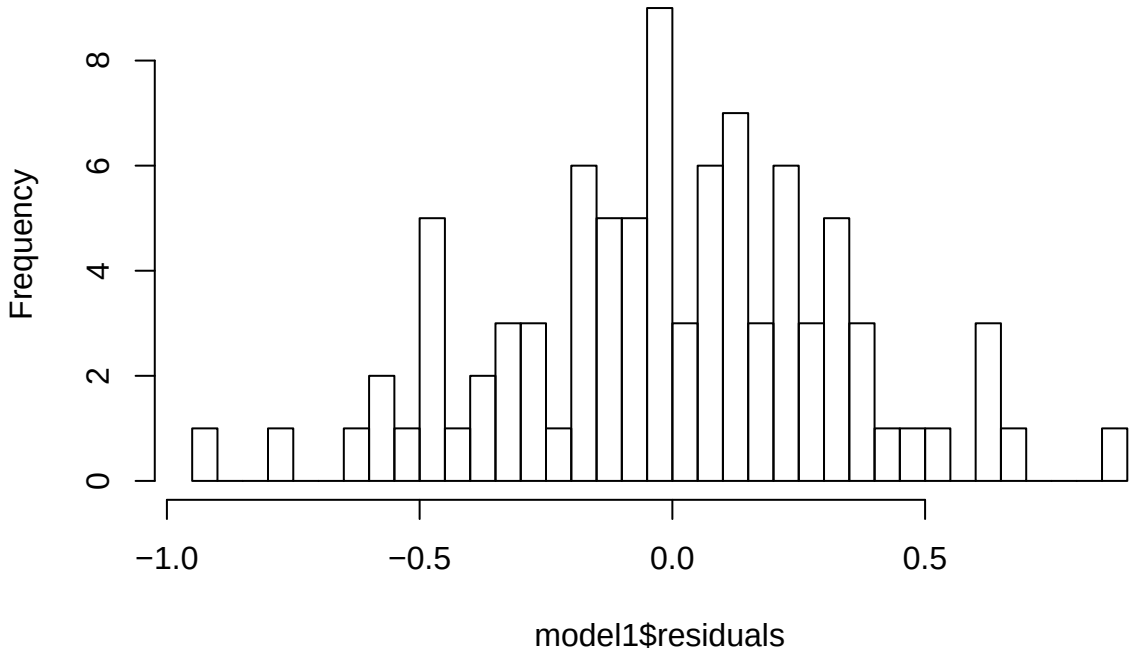
```r
plot(model1)
```


Residuals vs Fitted
Residuals
1.0
0.5
0.0
−0.5
−1.0
25
24
50
−5.0
−4.5
−4.0
−3.5
−3.0
−2.5
−2.0
Fitted values
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle)
Normal Q−Q
Standardized residuals
3
2
1
0
−1
−2
25
24
50
−2
−1
0
1
2
Theoretical Quantiles
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle)






```
hist(model1$residuals, breaks = 50)
```




```
shapiro.test(model1$residuals)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  model1$residuals
## W = 0.99469, p-value = 0.9778
```

```
#bptest(model1)
coeftest(model1, vcov = vcovHC)
```

```
##
## t test of coefficients:
##
##              Estimate Std. Error  t value  Pr(>|t|)
## (Intercept) -3.286263   0.199269 -16.4916 < 2.2e-16 ***
## density      0.157968   0.024286   6.5045 5.122e-09 ***
## prbarr      -1.358691   0.288442  -4.7105 9.541e-06 ***
## prbconv     -0.539663   0.127588  -4.2297 5.875e-05 ***
## pctymle      2.568311   1.009984   2.5429    0.0128 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
vcovHC(model1)
```

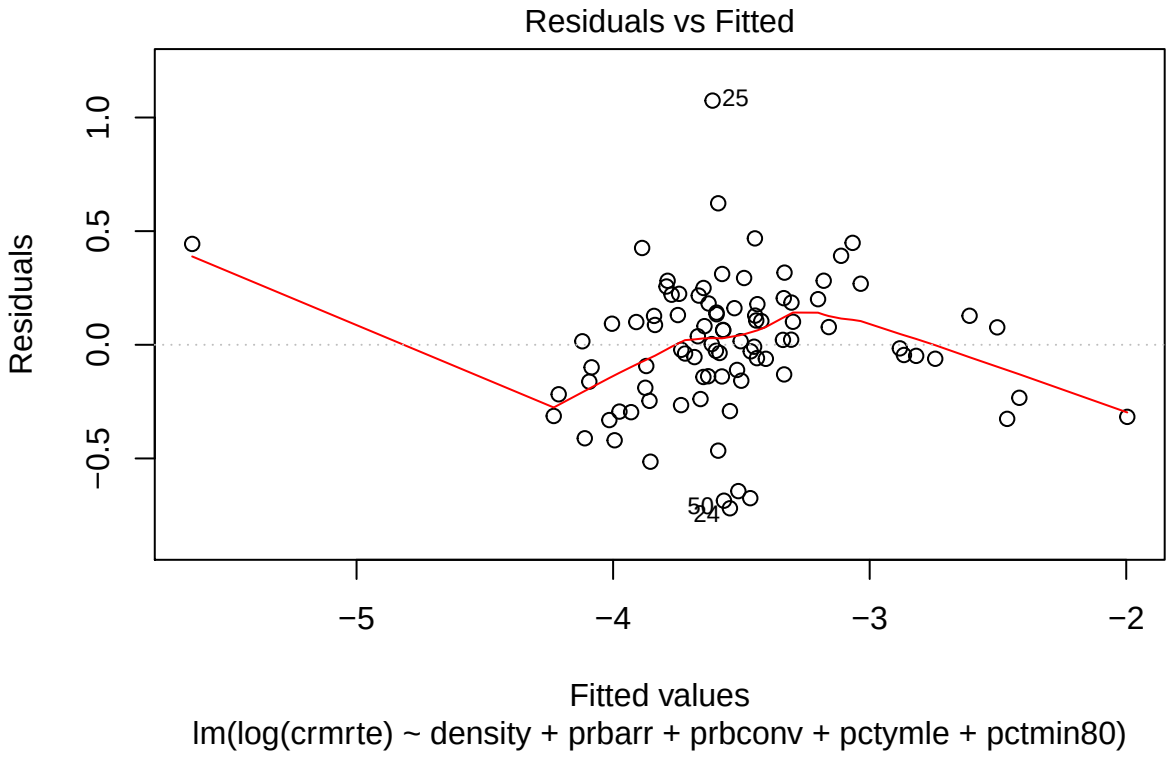
```
##              (Intercept)       density       prbarr      prbconv
## (Intercept)  0.039707959 -0.0031180979 -0.039536184 -0.017964110
## density     -0.003118098  0.0005897972  0.003025781  0.001650821
## prbarr      -0.039536184  0.0030257806  0.083198660  0.009323472
## prbconv     -0.017964110  0.0016508207  0.009323472  0.016278645
## pctymle     -0.124636201  0.0014447972  0.049269073  0.033328692
```

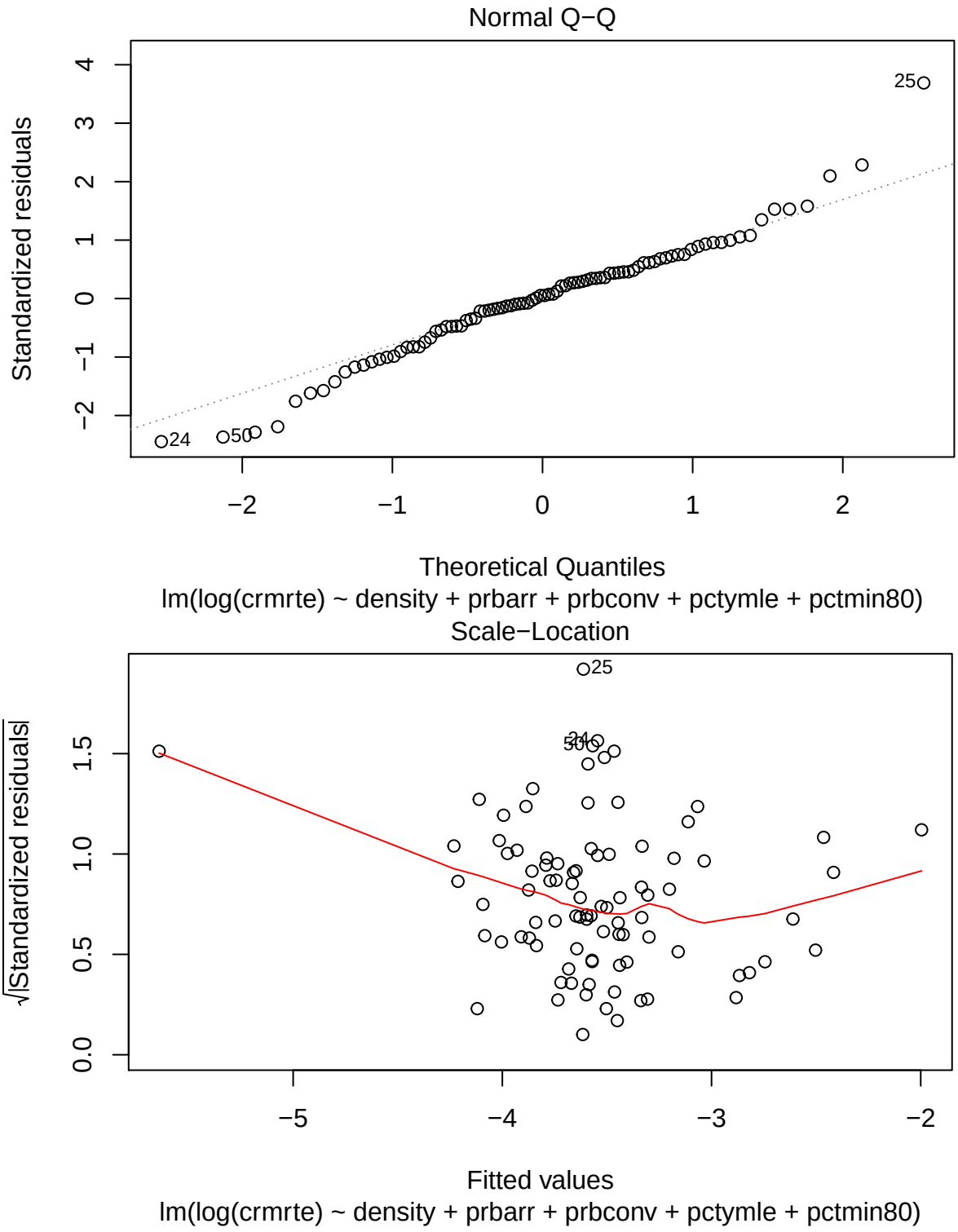
```
##                  pctymle
## (Intercept) -0.124636201
## density      0.001444797
## prbarr       0.049269073
## prbconv      0.033328692
## pctymle      1.020068311
```

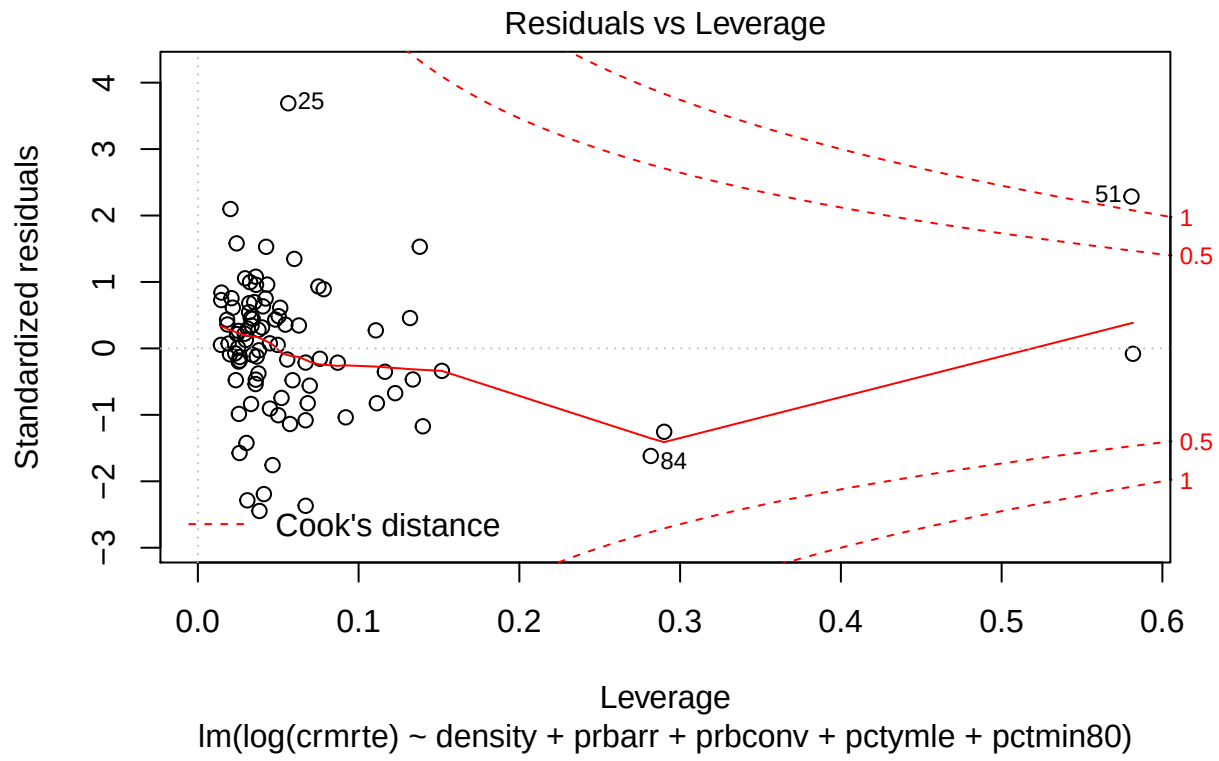
```
(se.model1 = sqrt(diag(vcovHC(model1))))
```

```
## (Intercept)     density      prbarr     prbconv     pctymle
##  0.19926856  0.02428574  0.28844178  0.12758779  1.00998431
```

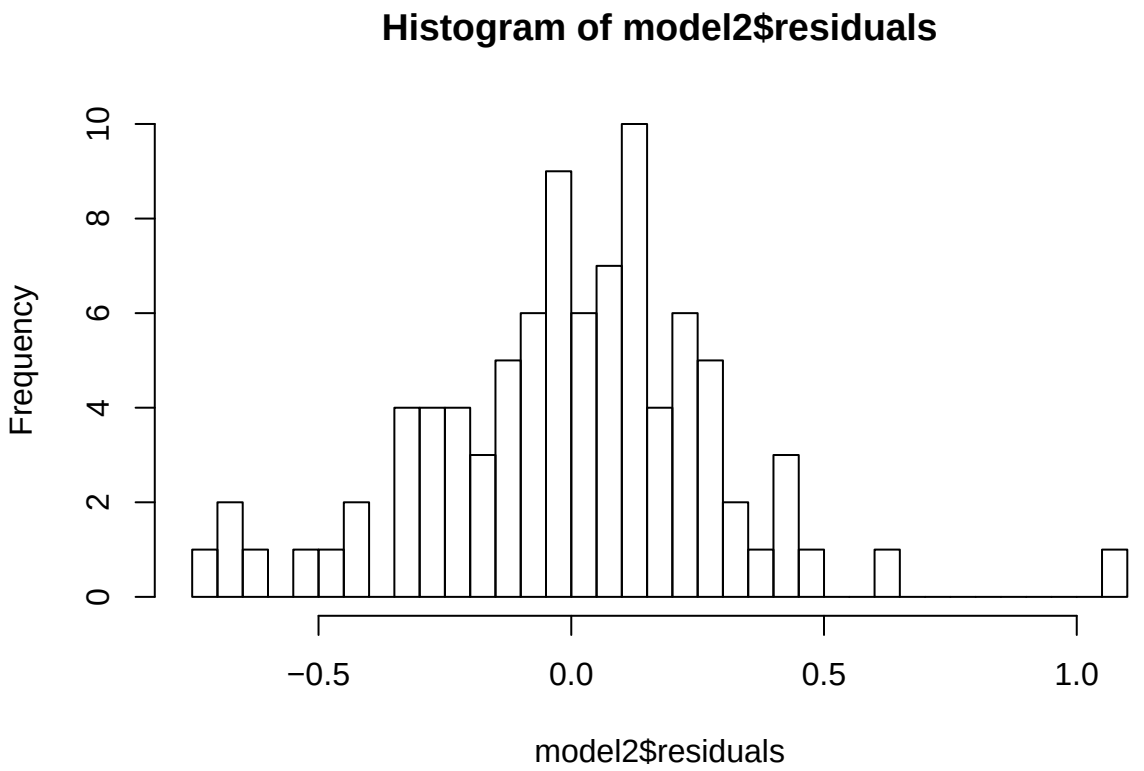
```
model2 = lm(log(crmrte) ~ density+prbarr +prbconv+ pctymle +pctmin80, data = data)
plot(model2)
```




Normal Q−Q
Standardized residuals
Theoretical Quantiles
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80)
Scale−Location
√|Standardized residuals|
Fitted values
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80)




```
hist(model2$residuals, breaks = 50)
```




```
coeftest(model2, vcov = vcovHC)
```

```
##
## t test of coefficients:
```

```
##
##               Estimate Std. Error  t value  Pr(>|t|)
## (Intercept) -3.5226686  0.3319505 -10.6120 < 2.2e-16 ***
## density      0.1637437  0.0309020   5.2988 9.227e-07 ***
## prbarr      -1.4040457  0.6241435  -2.2496  0.027092 *
## prbconv     -0.5650678  0.1811663  -3.1191  0.002486 **
## pctymle      2.5541424  0.9245515   2.7626  0.007044 **
## pctmin80     0.0099824  0.0023847   4.1860 6.959e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

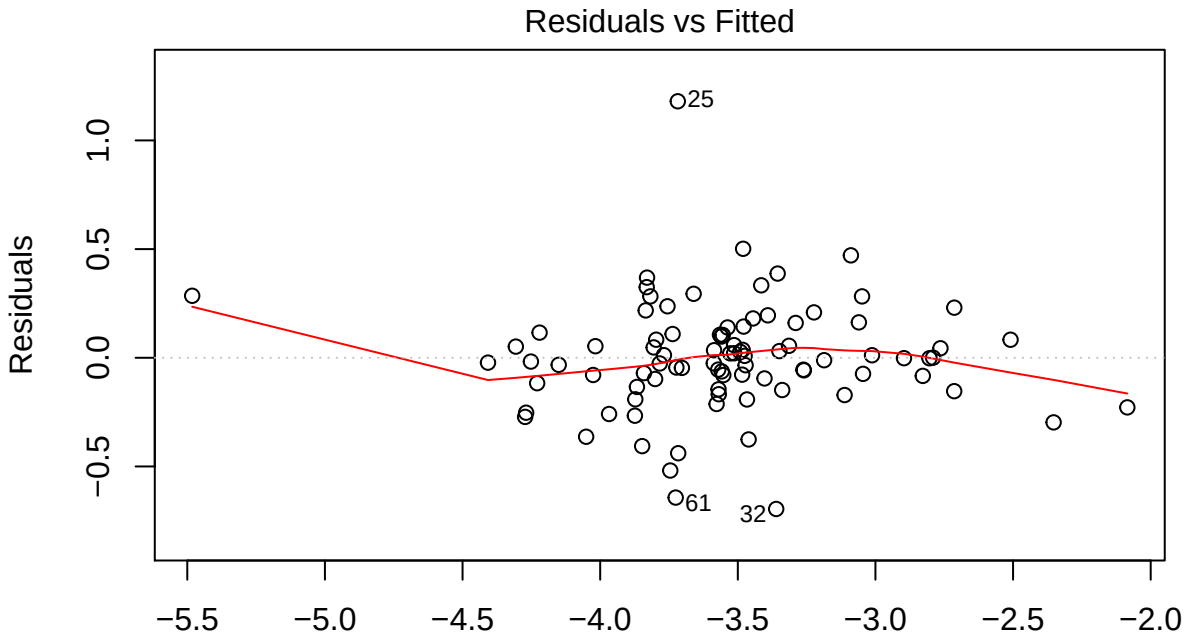
```
vcovHC(model2)
```

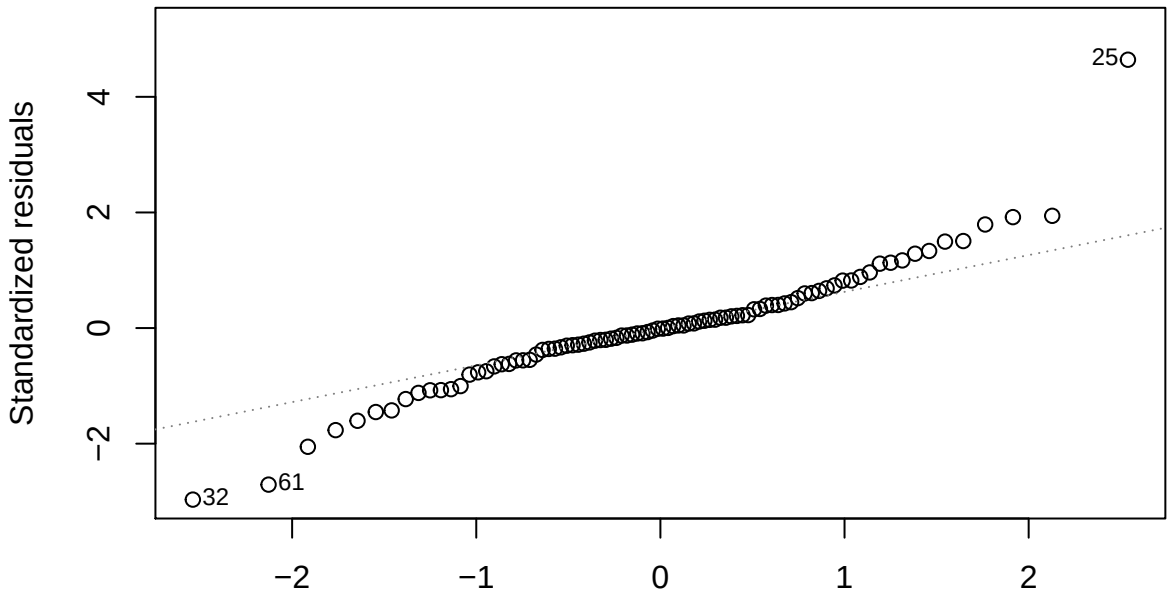
```
##              (Intercept)       density        prbarr       prbconv
## (Intercept)  0.110191142 -7.413951e-03 -0.1830272331 -5.261390e-02
## density     -0.007413951  9.549342e-04  0.0114245039  3.415134e-03
## prbarr      -0.183027233  1.142450e-02  0.3895550967  7.904746e-02
## prbconv     -0.052613899  3.415134e-03  0.0790474637  3.282122e-02
## pctymle     -0.234961963  9.785611e-03  0.3655408439  9.919799e-02
## pctmin80     0.000123508 -2.736686e-06 -0.0006976621 -4.782332e-05
##                   pctymle      pctmin80
## (Intercept) -0.2349619626  1.235080e-04
## density      0.0097856110 -2.736686e-06
## prbarr       0.3655408439 -6.976621e-04
## prbconv      0.0991979943 -4.782332e-05
## pctymle      0.8547954607 -5.934219e-04
## pctmin80    -0.0005934219  5.686807e-06
```

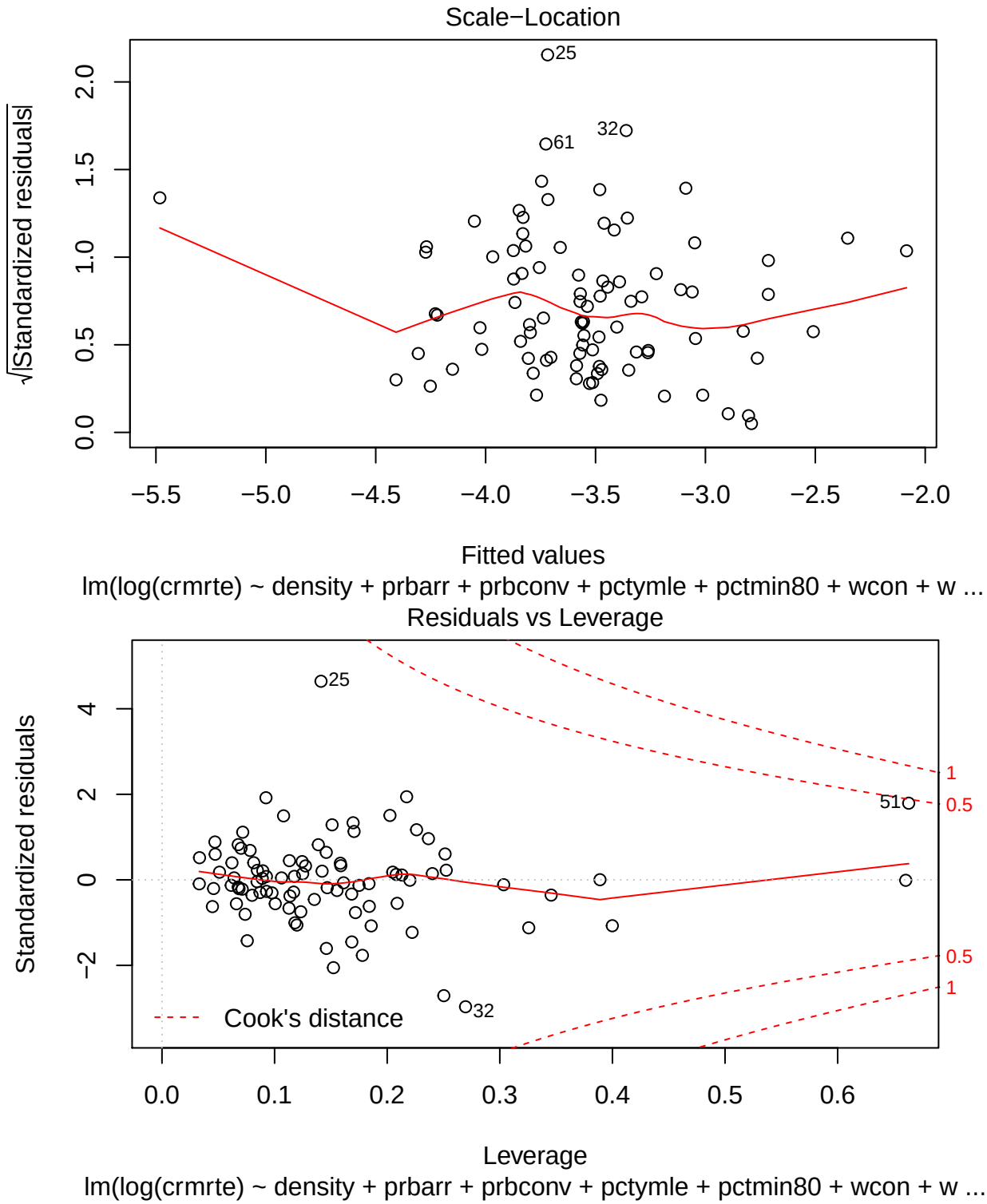
```
(se.model2 = sqrt(diag(vcovHC(model2))))
```

```
## (Intercept)     density      prbarr     prbconv     pctymle    pctmin80
## 0.331950512 0.030902010 0.624143491 0.181166274 0.924551492 0.002384703
```

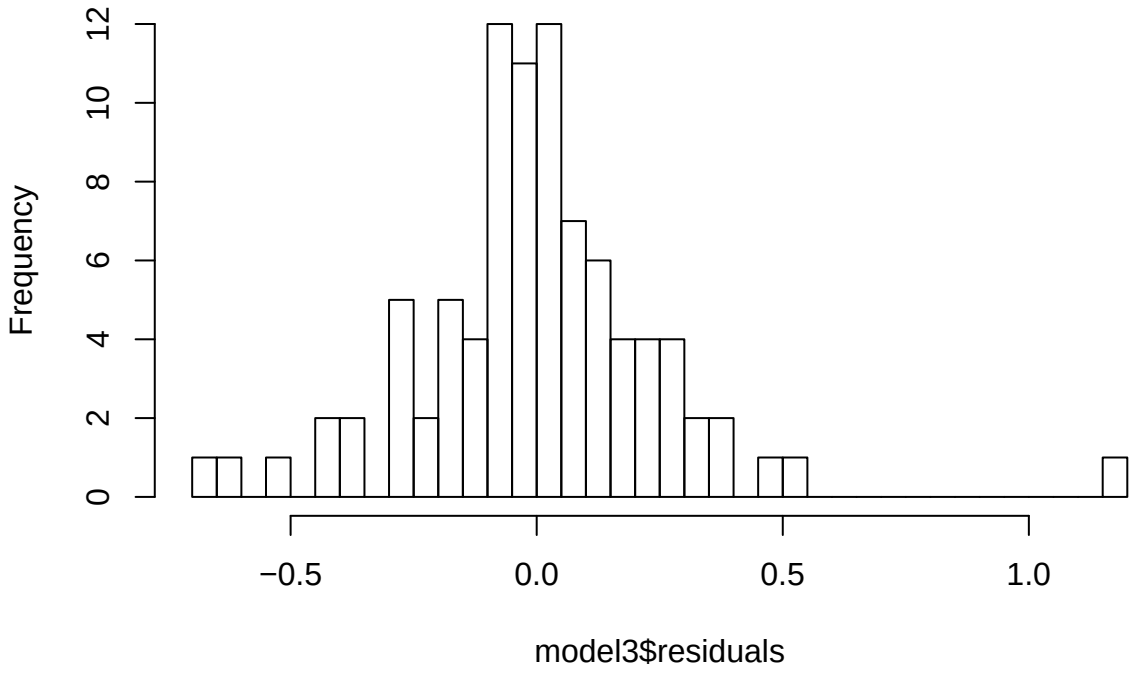
```
model3 = lm(log(crmrte) ~ density+prbarr +prbconv+ pctymle +pctmin80 + wcon+wtuc+wtrd+wfir+wmfg+wfed+ws
plot(model3)
```


Residuals vs Fitted
Residuals
1.0
0.5
0.0
−0.5
25
61
32
−5.5
−5.0
−4.5
−4.0
−3.5
−3.0
−2.5
−2.0
Fitted values
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80 + wcon + w ...


Normal Q−Q
Standardized residuals
4
2
0
−2
25
61
32
−2
−1
0
1
2
Theoretical Quantiles
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80 + wcon + w ...




```
hist(model3$residuals, breaks = 50)
```




```
coeftest(model3, vcov = vcovHC)
```

```
##
## t test of coefficients:
##
##                Estimate  Std. Error t value  Pr(>|t|)
## (Intercept) -4.5040e+00  7.6666e-01 -5.8749 1.053e-07 ***
## density      1.1096e-01  3.8989e-02  2.8460 0.0056878 **
## prbarr      -1.4613e+00  4.8999e-01 -2.9823 0.0038428 **
## prbconv     -6.1469e-01  1.5066e-01 -4.0799 0.0001101 ***
## pctymle      3.7130e+00  1.0217e+00  3.6340 0.0005048 ***
## pctmin80     1.0150e-02  2.0675e-03  4.9094 5.097e-06 ***
## wcon         7.0102e-05  9.3568e-04  0.0749 0.9404741
## wtuc         8.5259e-05  4.9736e-04  0.1714 0.8643458
## wtrd        -4.4686e-04  1.6674e-03 -0.2680 0.7894237
## wfir        -1.1553e-03  1.1680e-03 -0.9892 0.3257213
## wmfg         1.5716e-04  4.3767e-04  0.3591 0.7205334
## wfed         2.3931e-03  1.1488e-03  2.0832 0.0405967 *
## wsta        -1.4772e-03  8.2566e-04 -1.7892 0.0775723 .
## wloc         2.6484e-03  2.2645e-03  1.1695 0.2458547
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
vcovHC(model3)
```

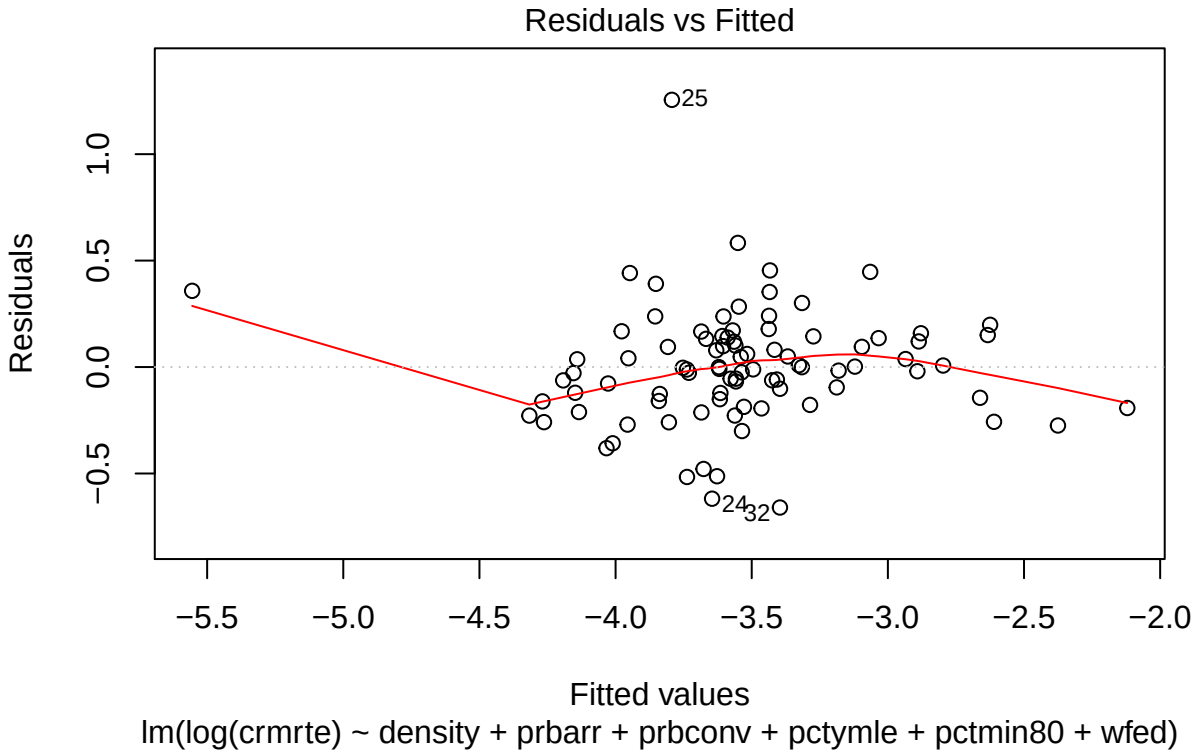
```
##               (Intercept)       density        prbarr       prbconv
## (Intercept)  5.877602e-01  1.427372e-02 -1.935844e-01 -3.626482e-02
## density      1.427372e-02  1.520114e-03  4.935234e-03  2.327759e-03
## prbarr      -1.935844e-01  4.935234e-03  2.400911e-01  4.484087e-02
## prbconv     -3.626482e-02  2.327759e-03  4.484087e-02  2.269903e-02
## pctymle     -3.324678e-01  1.114239e-03  2.832883e-01  8.894446e-02
```

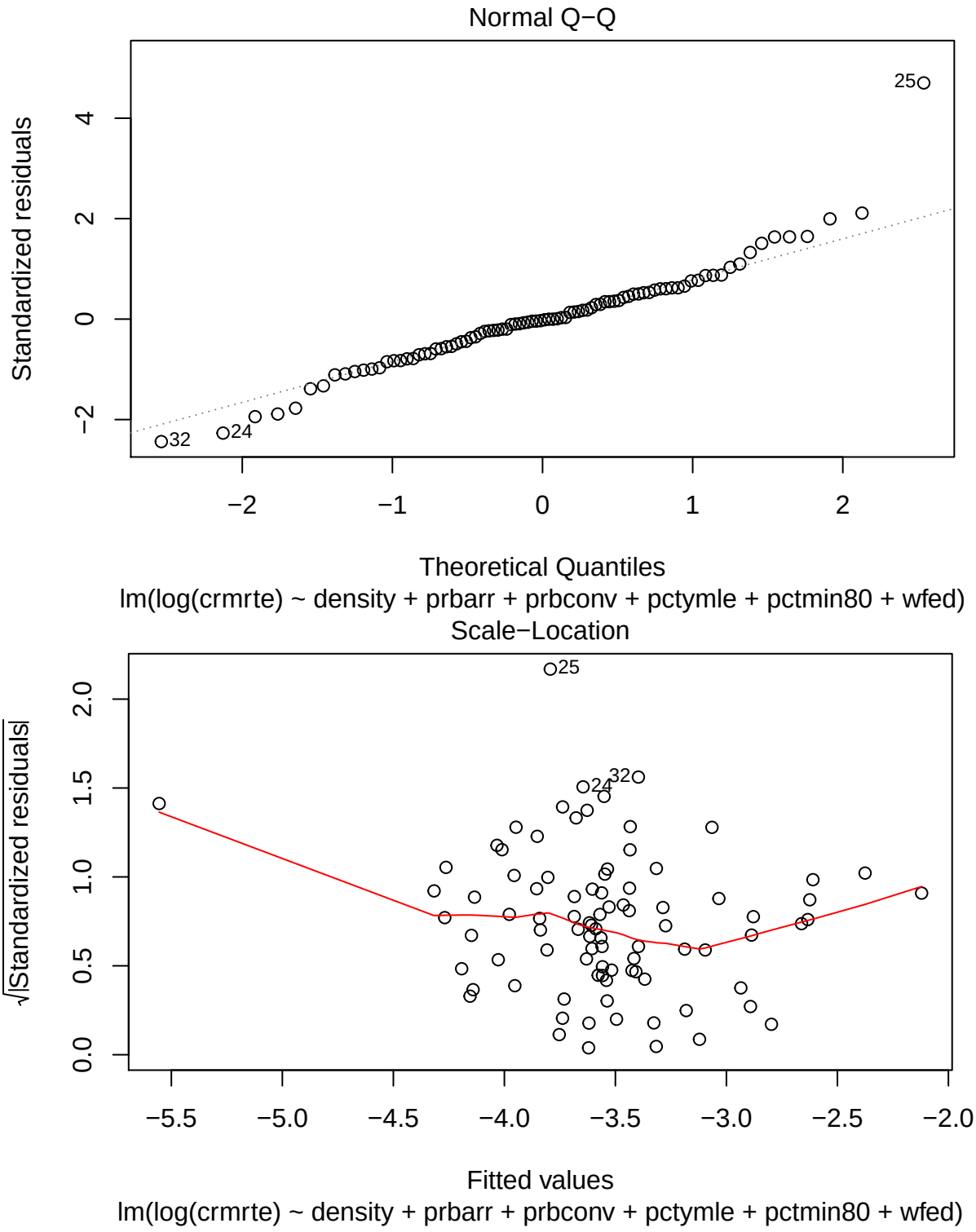
```
## pctmin80    -1.036327e-04 -2.213500e-05 -4.437160e-04 -3.158593e-05
## wcon         7.316194e-05 -2.745857e-06 -1.770620e-04 -3.186159e-05
## wtuc        -1.397897e-04 -3.260551e-06  3.366804e-05 -1.716920e-06
## wtrd        -9.258375e-06 -1.642945e-05 -7.354846e-05  1.134164e-05
## wfir        -2.324086e-04 -1.894899e-05 -2.173772e-05 -5.761486e-05
## wmfg        -1.802676e-04 -8.515618e-06  3.375773e-05 -7.436141e-06
## wfed        -6.539306e-06  1.120253e-05  1.814926e-04  7.420264e-05
## wsta        -2.365546e-04 -9.043341e-06  4.906564e-05 -1.261650e-05
## wloc        -7.848876e-04 -1.977890e-05  9.087894e-05  1.652967e-06
##                    pctymle      pctmin80          wcon          wtuc
## (Intercept) -3.324678e-01 -1.036327e-04  7.316194e-05 -1.397897e-04
## density      1.114239e-03 -2.213500e-05 -2.745857e-06 -3.260551e-06
## prbarr       2.832883e-01 -4.437160e-04 -1.770620e-04  3.366804e-05
## prbconv      8.894446e-02 -3.158593e-05 -3.186159e-05 -1.716920e-06
## pctymle      1.043963e+00 -1.900778e-04 -3.464811e-04 -7.113918e-07
## pctmin80    -1.900778e-04  4.274693e-06  2.761976e-07 -1.032628e-07
## wcon        -3.464811e-04  2.761976e-07  8.754900e-07  2.729376e-08
## wtuc        -7.113918e-07 -1.032628e-07  2.729376e-08  2.473636e-07
## wtrd         2.489227e-04  6.265120e-07 -4.237405e-07 -1.799865e-07
## wfir         3.196134e-05  6.287951e-07 -1.725262e-07  2.593983e-08
## wmfg         1.994972e-05  1.615563e-07  2.181984e-08  1.080608e-08
## wfed         8.080862e-04 -2.226007e-07 -4.122358e-07 -1.495536e-07
## wsta        -3.142561e-05 -3.301284e-07  1.320677e-07  1.811002e-07
## wloc        -6.749148e-04 -3.824000e-08  1.240286e-07  1.902241e-07
##                    wtrd          wfir          wmfg          wfed
## (Intercept) -9.258375e-06 -2.324086e-04 -1.802676e-04 -6.539306e-06
## density     -1.642945e-05 -1.894899e-05 -8.515618e-06  1.120253e-05
## prbarr      -7.354846e-05 -2.173772e-05  3.375773e-05  1.814926e-04
## prbconv      1.134164e-05 -5.761486e-05 -7.436141e-06  7.420264e-05
## pctymle      2.489227e-04  3.196134e-05  1.994972e-05  8.080862e-04
## pctmin80     6.265120e-07  6.287951e-07  1.615563e-07 -2.226007e-07
## wcon        -4.237405e-07 -1.725262e-07  2.181984e-08 -4.122358e-07
## wtuc        -1.799865e-07  2.593983e-08  1.080608e-08 -1.495536e-07
## wtrd         2.780191e-06 -2.139315e-07  1.609115e-07 -1.475955e-07
## wfir        -2.139315e-07  1.364195e-06  1.545710e-07 -1.711457e-07
## wmfg         1.609115e-07  1.545710e-07  1.915578e-07 -1.243436e-07
## wfed        -1.475955e-07 -1.711457e-07 -1.243436e-07  1.319665e-06
## wsta        -1.280075e-08  8.453622e-08  1.361265e-07 -2.650793e-07
## wloc        -9.314010e-07 -2.642834e-07  1.023000e-07 -1.188731e-06
##                    wsta          wloc
## (Intercept) -2.365546e-04 -7.848876e-04
## density     -9.043341e-06 -1.977890e-05
## prbarr       4.906564e-05  9.087894e-05
## prbconv     -1.261650e-05  1.652967e-06
## pctymle     -3.142561e-05 -6.749148e-04
## pctmin80    -3.301284e-07 -3.824000e-08
## wcon         1.320677e-07  1.240286e-07
## wtuc         1.811002e-07  1.902241e-07
## wtrd        -1.280075e-08 -9.314010e-07
## wfir         8.453622e-08 -2.642834e-07
## wmfg         1.361265e-07  1.023000e-07
## wfed        -2.650793e-07 -1.188731e-06
## wsta         6.817165e-07 -1.666437e-07
## wloc        -1.666437e-07  5.128151e-06
```

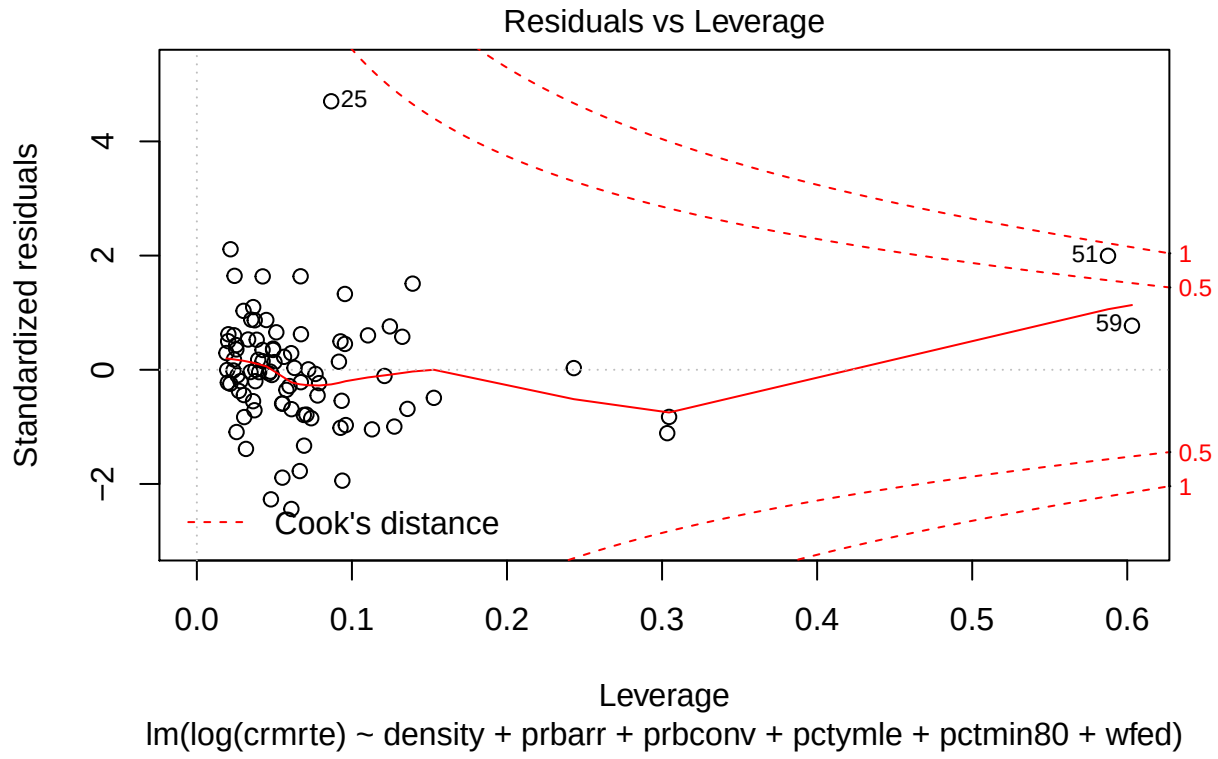
```
(se.model3 = sqrt(diag(vcovHC(model3))))
```

```
##  (Intercept)      density       prbarr      prbconv      pctymle
## 0.7666552193 0.0389886412 0.4899909344 0.1506619728 1.0217452023
##     pctmin80         wcon         wtuc         wtrd         wfir
## 0.0020675332 0.0009356762 0.0004973566 0.0016673906 0.0011679878
##         wmfg         wfed         wsta         wloc
## 0.0004376732 0.0011487668 0.0008256612 0.0022645422
```

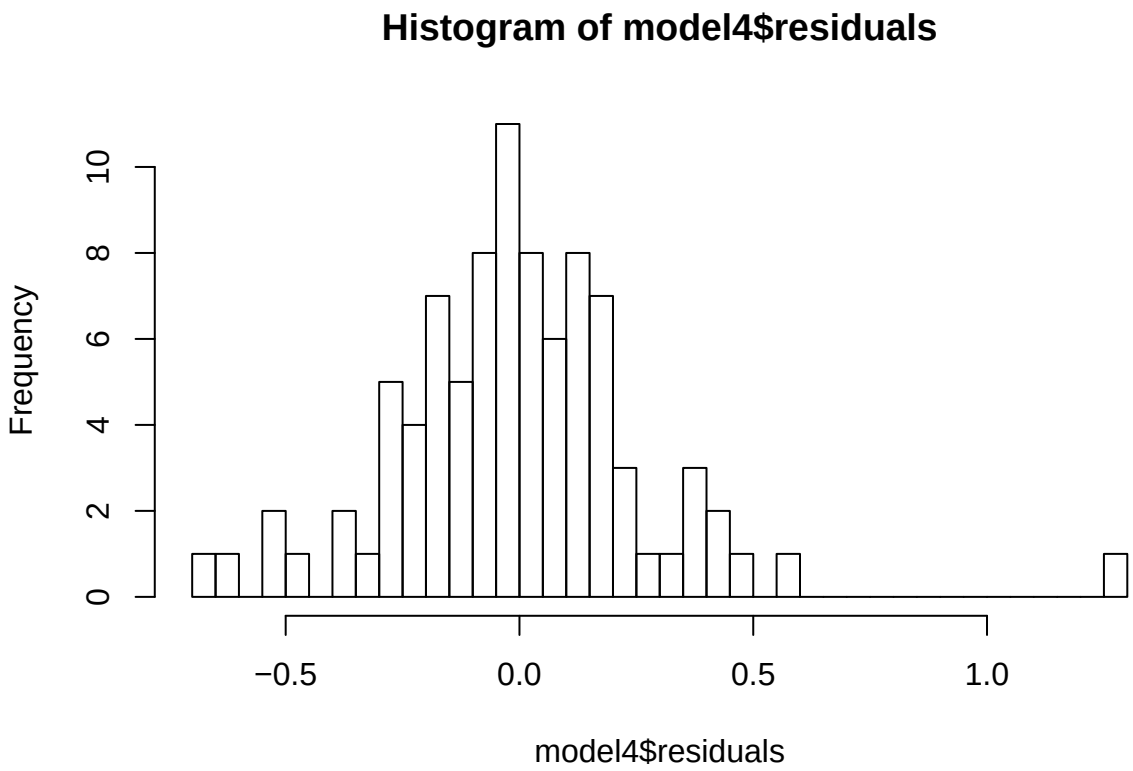
```
model4 = lm(log(crmrte) ~ density+prbarr +prbconv+ pctymle +pctmin80 + wfed, data = data)
plot(model4)
```




Normal Q−Q
Standardized residuals
Theoretical Quantiles
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80 + wfed)
Scale−Location
√|Standardized residuals|
Fitted values
lm(log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80 + wfed)




```
hist(model4$residuals, breaks = 50)
```




```
coeftest(model4, vcov = vcovHC)
```

```
##
## t test of coefficients:
```

```
##
##                Estimate  Std. Error t value  Pr(>|t|)
## (Intercept) -4.52147189  0.58943923 -7.6708 2.932e-11 ***
## density      0.10872077  0.02252451  4.8268 6.238e-06 ***
## prbarr      -1.35255949  0.52862670 -2.5586 0.0123242 *
## prbconv     -0.58389934  0.14868451 -3.9271 0.0001769 ***
## pctymle      3.32128948  1.55571681  2.1349 0.0357184 *
## pctmin80     0.00938749  0.00204169  4.5979 1.512e-05 ***
## wfed         0.00231335  0.00085189  2.7156 0.0080481 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
vcovHC(model4)
```

```
##               (Intercept)       density        prbarr       prbconv
## (Intercept)  3.474386e-01 -3.601517e-04 -0.2091746685 -6.204988e-02
## density     -3.601517e-04  5.073536e-04  0.0047192859  1.309273e-03
## prbarr      -2.091747e-01  4.719286e-03  0.2794461836  5.678803e-02
## prbconv     -6.204988e-02  1.309273e-03  0.0567880253  2.210708e-02
## pctymle     -5.670875e-01  3.315003e-03  0.3643764851  1.041438e-01
## pctmin80    -4.860259e-05 -4.320184e-06 -0.0004408251 -2.953316e-05
## wfed        -4.438639e-04 -5.746286e-06  0.0001615444  5.268268e-05
##                    pctymle      pctmin80          wfed
## (Intercept) -0.5670874739 -4.860259e-05 -4.438639e-04
## density      0.0033150025 -4.320184e-06 -5.746286e-06
## prbarr       0.3643764851 -4.408251e-04  1.615444e-04
## prbconv      0.1041437769 -2.953316e-05  5.268268e-05
## pctymle      2.4202547852 -1.785249e-04  4.449632e-04
## pctmin80    -0.0001785249  4.168479e-06  2.167675e-07
## wfed         0.0004449632  2.167675e-07  7.257096e-07
```

```
(se.model4 = sqrt(diag(vcovHC(model4))))
```

```
##  (Intercept)      density       prbarr      prbconv      pctymle
## 0.5894392343 0.0225245109 0.5286266959 0.1486845072 1.5557168075
##     pctmin80         wfed
## 0.0020416853 0.0008518859
```

```
stargazer(model1, model2, model3, model4, type="text", omit.stat="F",
se=list(se.model1, se.model2),star.cutoffs=c(0.05, 0.01, 0.001))
```

```
##
## ================================================================================
##                                        Dependent variable:
##                    ------------------------------------------------------------
##                                           log(crmrte)
##                           (1)             (2)             (3)             (4)
## --------------------------------------------------------------------------------
## density                0.158***        0.164***        0.111***        0.109***
##                         (0.024)         (0.031)         (0.028)         (0.026)
##
## prbarr                 -1.359***        -1.404*        -1.461***       -1.353***
##                         (0.288)         (0.624)         (0.242)         (0.232)
##
## prbconv                -0.540***       -0.565**        -0.615***       -0.584***
##                         (0.128)         (0.181)         (0.093)         (0.088)
```

```
##
## pctymle                  2.568*          2.554**         3.713**         3.321*
##                          (1.010)         (0.925)         (1.342)         (1.320)
##
## pctmin80                                 0.010***        0.010***        0.009***
##                                          (0.002)         (0.002)         (0.002)
##
## wcon                                                     0.0001
##                                                          (0.001)
##
## wtuc                                                     0.0001
##                                                         (0.0005)
##
## wtrd                                                    -0.0004
##                                                          (0.001)
##
## wfir                                                     -0.001
##                                                          (0.001)
##
## wmfg                                                     0.0002
##                                                         (0.0004)
##
## wfed                                                     0.002**         0.002***
##                                                          (0.001)         (0.001)
##
## wsta                                                     -0.001
##                                                          (0.001)
##
## wloc                                                      0.003
##                                                          (0.001)
##
## Constant                -3.286***       -3.523***       -4.504***       -4.521***
##                          (0.199)         (0.332)         (0.488)         (0.320)
##
## ------------------------------------------------------------------------------------
## Observations               90              90              90              90
## R2                        0.624           0.718           0.787           0.758
## Adjusted R2               0.606           0.702           0.750           0.741
## Residual Std. Error 0.344 (df = 85) 0.300 (df = 84) 0.274 (df = 76) 0.279 (df = 83)
## ====================================================================================
## Note:                                                *p<0.05; **p<0.01; ***p<0.001
```

```
linearHypothesis(model3, c("wcon = 0", "wtuc = 0", "wtrd = 0", "wfir = 0", "wmfg = 0", "wfed = 0", "wsta
```

```
## Linear hypothesis test
##
## Hypothesis:
## wcon = 0
## wtuc = 0
## wtrd = 0
## wfir = 0
## wmfg = 0
## wfed = 0
## wsta = 0
## wloc = 0
```

```
##
## Model 1: restricted model
## Model 2: log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80 +
##     wcon + wtuc + wtrd + wfir + wmfg + wfed + wsta + wloc
##
## Note: Coefficient covariance matrix supplied.
##
##   Res.Df Df      F Pr(>F)
## 1     84
## 2     76  8 2.1637 0.0397 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
linearHypothesis(model3, c("wcon = 0", "wtuc = 0", "wtrd = 0", "wfir = 0", "wmfg = 0", "wsta = 0", "wloc
```

```
## Linear hypothesis test
##
## Hypothesis:
## wcon = 0
## wtuc = 0
## wtrd = 0
## wfir = 0
## wmfg = 0
## wsta = 0
## wloc = 0
##
## Model 1: restricted model
## Model 2: log(crmrte) ~ density + prbarr + prbconv + pctymle + pctmin80 +
##     wcon + wtuc + wtrd + wfir + wmfg + wfed + wsta + wloc
##
## Note: Coefficient covariance matrix supplied.
##
##   Res.Df Df      F Pr(>F)
## 1     83
## 2     76  7 1.1387 0.3483
```

```
summary(model1)
```

```
##
## Call:
## lm(formula = log(crmrte) ~ density + prbarr + prbconv + pctymle,
##     data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.91089 -0.18643 -0.00531  0.22374  0.88917
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -3.28626    0.20688 -15.885  < 2e-16 ***
## density      0.15797    0.02607   6.059 3.62e-08 ***
## prbarr      -1.35869    0.28506  -4.766 7.67e-06 ***
## prbconv     -0.53966    0.10831  -4.983 3.26e-06 ***
## pctymle      2.56831    1.60841   1.597    0.114
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3444 on 85 degrees of freedom
## Multiple R-squared:  0.6237, Adjusted R-squared:  0.606
## F-statistic: 35.22 on 4 and 85 DF,  p-value: < 2.2e-16
```

```
summary(model2)
```

```
##
## Call:
## lm(formula = log(crmrte) ~ density + prbarr + prbconv + pctymle +
##     pctmin80, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.71927 -0.15391  0.01556  0.17430  1.07432
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -3.522669   0.185471 -18.993  < 2e-16 ***
## density      0.163744   0.022717   7.208 2.27e-10 ***
## prbarr      -1.404046   0.248244  -5.656 2.09e-07 ***
## prbconv     -0.565068   0.094385  -5.987 5.10e-08 ***
## pctymle      2.554142   1.399848   1.825   0.0716 .
## pctmin80     0.009982   0.001879   5.312 8.75e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2998 on 84 degrees of freedom
## Multiple R-squared:  0.7183, Adjusted R-squared:  0.7016
## F-statistic: 42.84 on 5 and 84 DF,  p-value: < 2.2e-16
```

```
summary(model3)
```

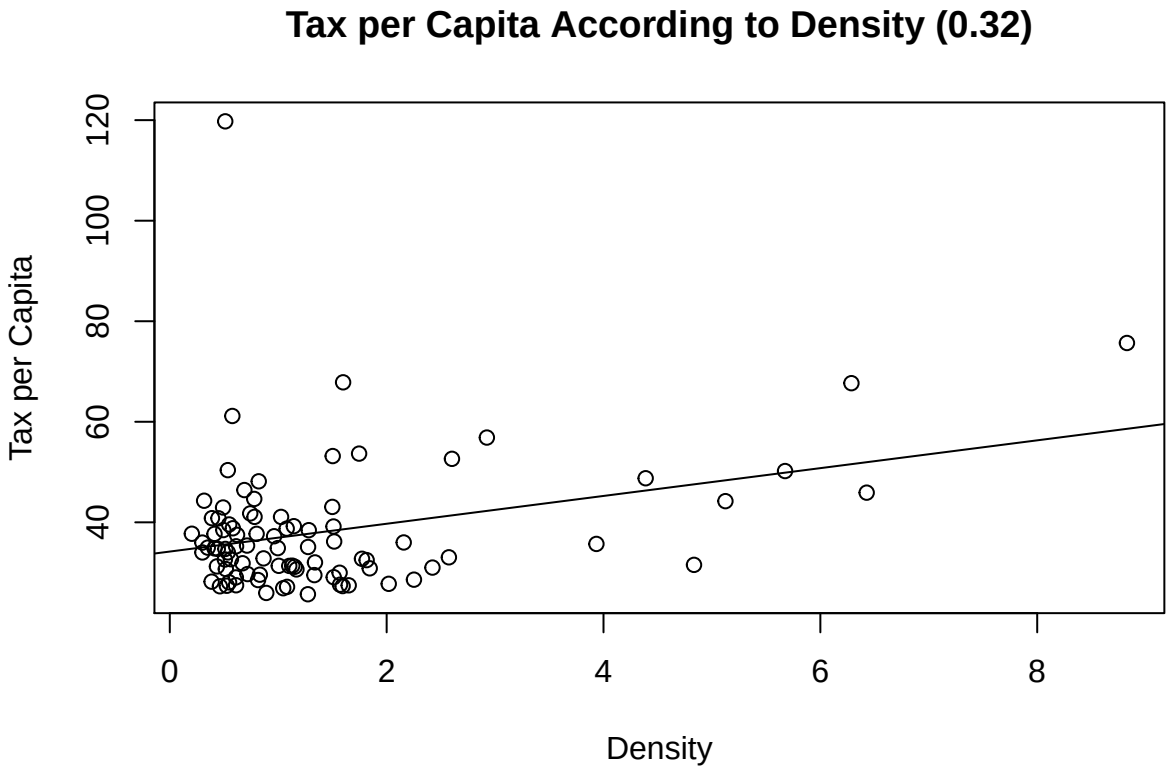
```
##
## Call:
## lm(formula = log(crmrte) ~ density + prbarr + prbconv + pctymle +
##     pctmin80 + wcon + wtuc + wtrd + wfir + wmfg + wfed + wsta +
##     wloc, data = data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.6956 -0.1121 -0.0020  0.1084  1.1800
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -4.504e+00  4.876e-01  -9.237 4.70e-14 ***
## density      1.110e-01  2.831e-02   3.920 0.000192 ***
## prbarr      -1.461e+00  2.417e-01  -6.046 5.16e-08 ***
## prbconv     -6.147e-01  9.306e-02  -6.605 4.82e-09 ***
## pctymle      3.713e+00  1.342e+00   2.766 0.007115 **
## pctmin80     1.015e-02  1.792e-03   5.665 2.50e-07 ***
## wcon         7.010e-05  8.440e-04   0.083 0.934020
## wtuc         8.526e-05  4.681e-04   0.182 0.855945
## wtrd        -4.469e-04  1.486e-03  -0.301 0.764495
```

```
## wfir        -1.155e-03  8.643e-04  -1.337 0.185279
## wmfg         1.572e-04  4.372e-04   0.359 0.720258
## wfed         2.393e-03  7.608e-04   3.146 0.002366 **
## wsta        -1.477e-03  8.010e-04  -1.844 0.069029 .
## wloc         2.648e-03  1.490e-03   1.777 0.079564 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2743 on 76 degrees of freedom
## Multiple R-squared:  0.7867, Adjusted R-squared:  0.7502
## F-statistic: 21.56 on 13 and 76 DF,  p-value: < 2.2e-16
```

```
summary(model4)
```

```
##
## Call:
## lm(formula = log(crmrte) ~ density + prbarr + prbconv + pctymle +
##     pctmin80 + wfed, data = data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.65979 -0.15735 -0.00607  0.13788  1.25506
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) -4.5214719  0.3196548 -14.145  < 2e-16 ***
## density      0.1087208  0.0258334   4.209 6.47e-05 ***
## prbarr      -1.3525595  0.2316728  -5.838 9.92e-08 ***
## prbconv     -0.5838993  0.0880726  -6.630 3.18e-09 ***
## pctymle      3.3212895  1.3203200   2.516 0.013814 *
## pctmin80     0.0093875  0.0017580   5.340 7.96e-07 ***
## wfed         0.0023133  0.0006229   3.714 0.000369 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2793 on 83 degrees of freedom
## Multiple R-squared:  0.7585, Adjusted R-squared:  0.741
## F-statistic: 43.44 on 6 and 83 DF,  p-value: < 2.2e-16
```

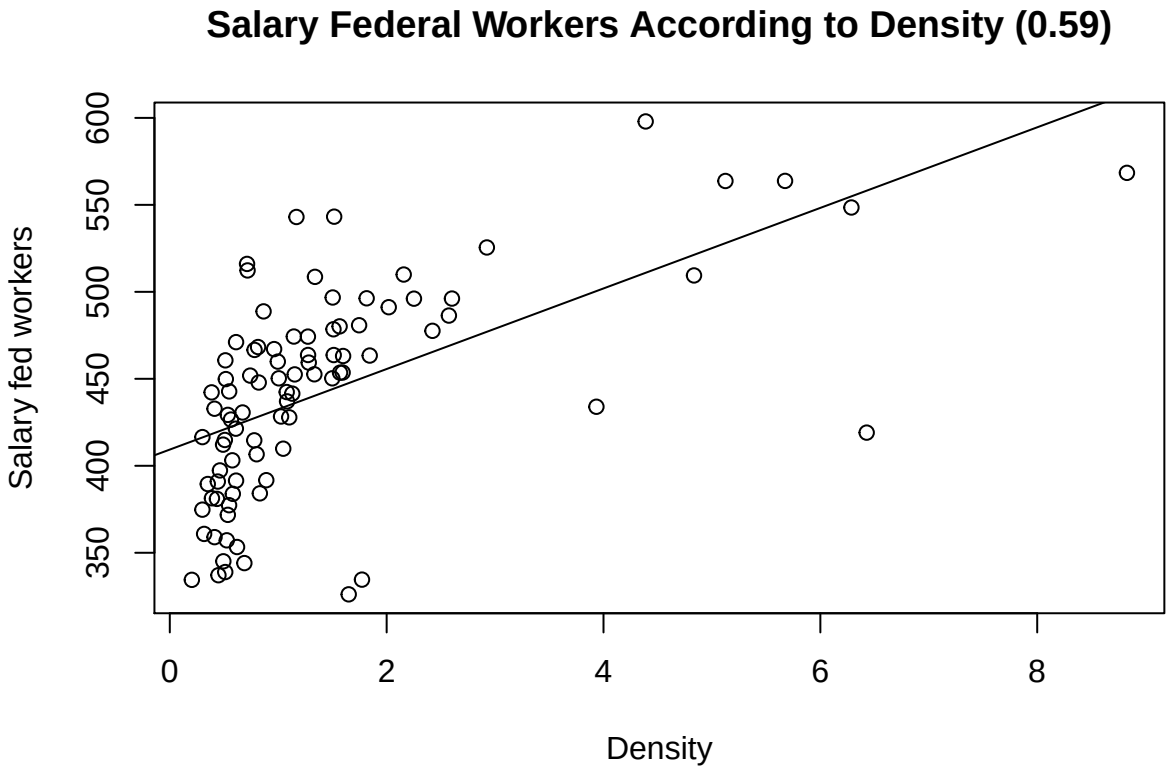
```
plot(data$taxpc~data$density, ylab = "Tax per Capita", xlab = "Density", main="Tax per Capita According
abline(lm(data$taxpc~data$density))
```




```
cor(data$taxpc,data$density)
```

```
## [1] 0.3204737
```

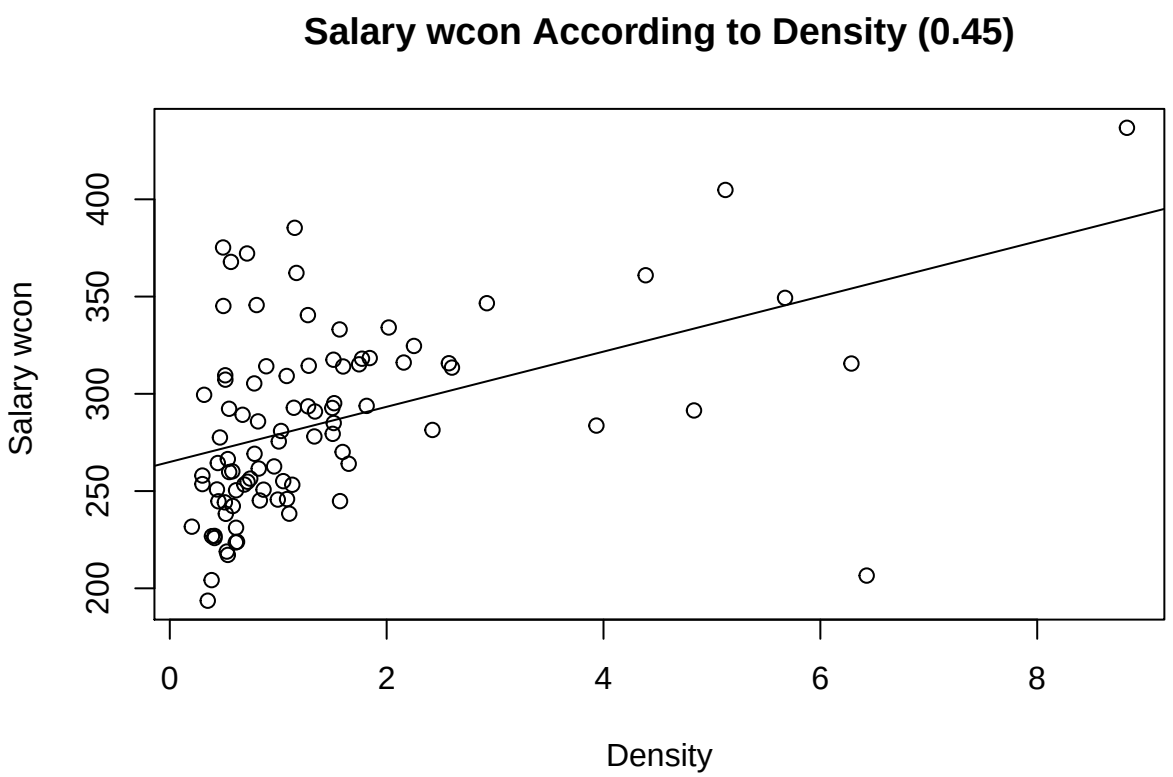
```
plot(data$wfed~data$density, ylab = "Salary fed workers", xlab = "Density", main="Salary Federal Workers
abline(lm(data$wfed~data$density))
```



```r
cor(data$wfed,data$density)
```

```
## [1] 0.5869322
```

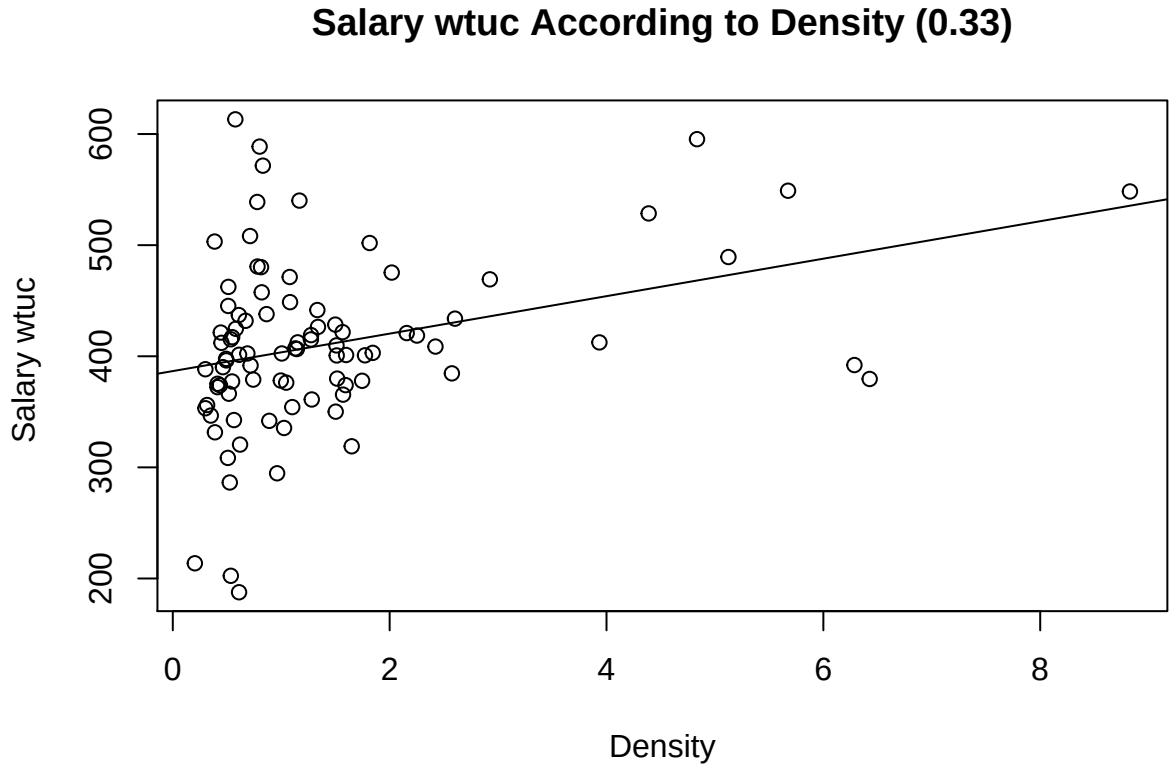
```r
plot(data$wcon~data$density, ylab = "Salary wcon ", xlab = "Density", main="Salary wcon According to Den
abline(lm(data$wcon~data$density))
```




```r
cor(data$wcon,data$density)
```

```
## [1] 0.4513494
```

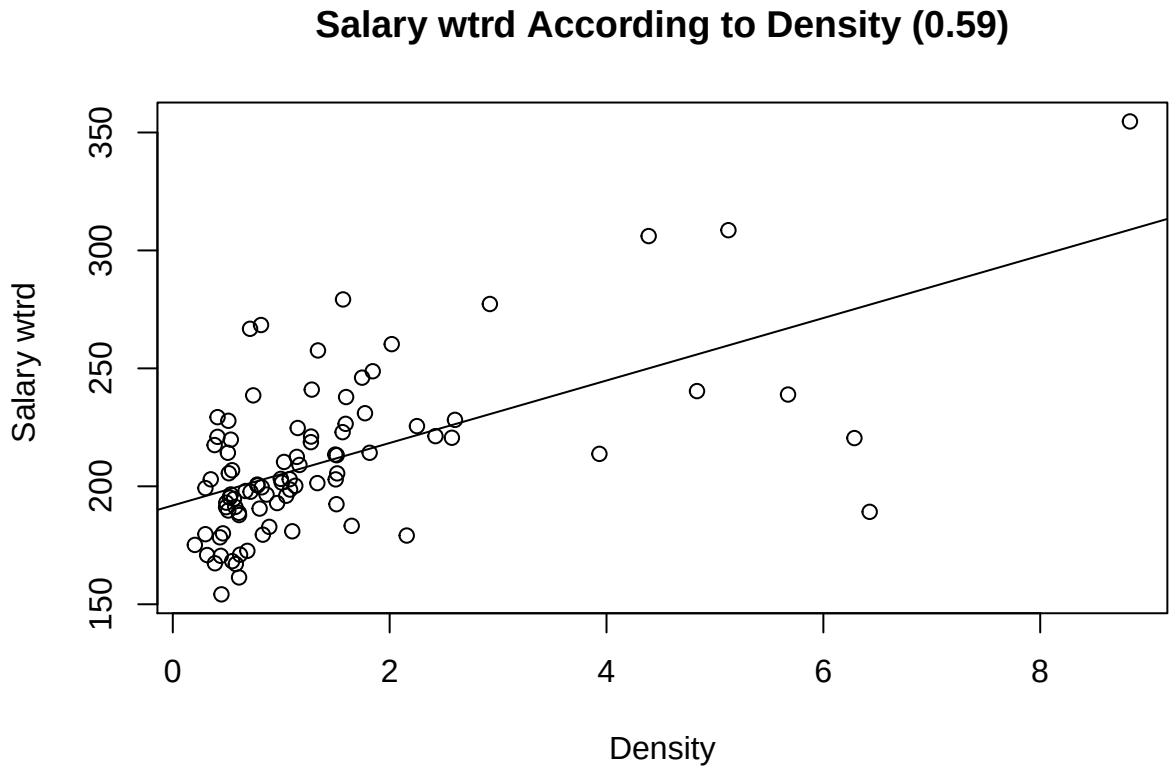
```r
plot(data$wtuc~data$density, ylab = "Salary wtuc ", xlab = "Density", main="Salary wtuc According to Den
abline(lm(data$wtuc~data$density))
```




```
cor(data$wtuc,data$density)
```

```
## [1] 0.3311945
```

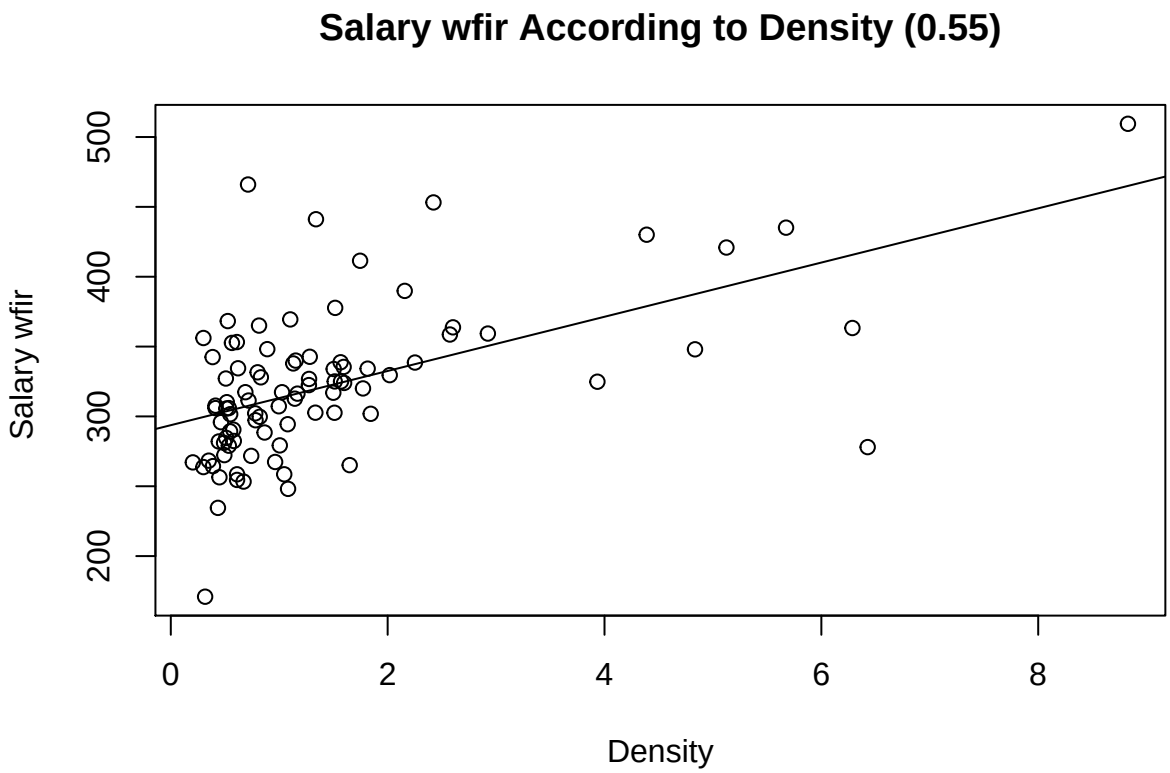
```
plot(data$wtrd~data$density, ylab = "Salary wtrd ", xlab = "Density", main="Salary wtrd According to Den
abline(lm(data$wtrd~data$density))
```



```r
cor(data$wtrd,data$density)
```

```
## [1] 0.5941474
```

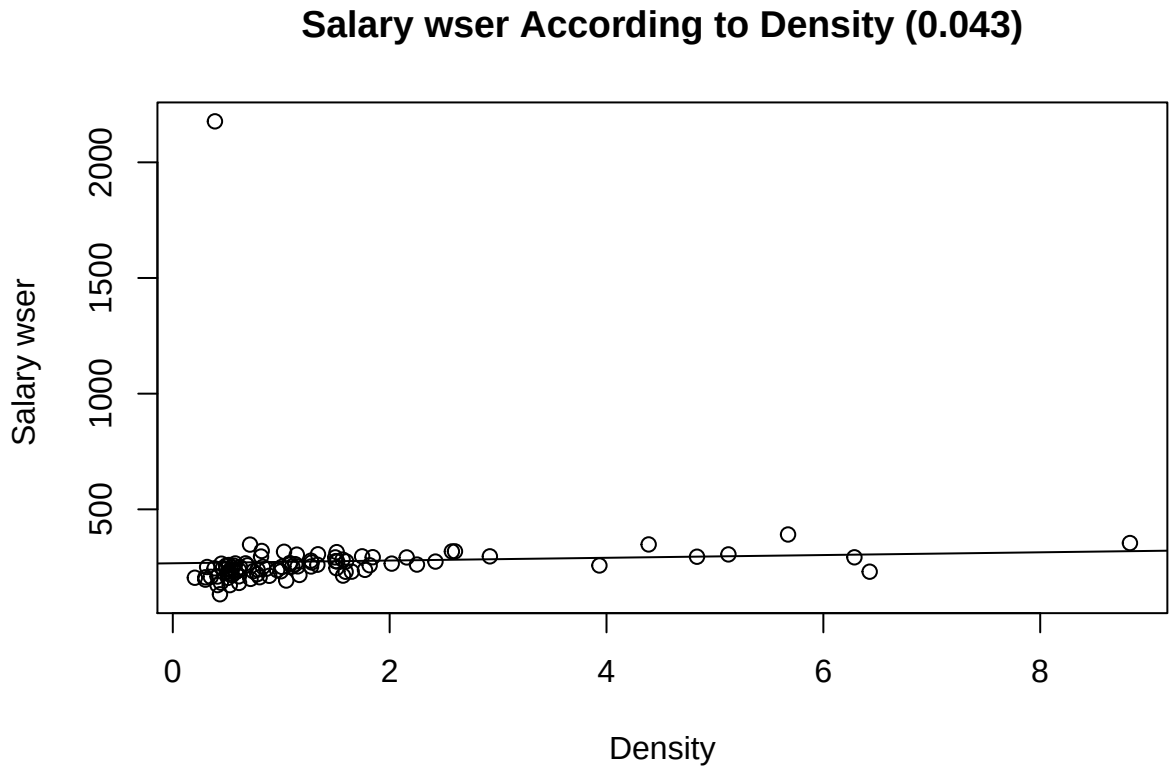
```r
plot(data$wfir~data$density, ylab = "Salary wfir ", xlab = "Density", main="Salary wfir According to Den
abline(lm(data$wfir~data$density))
```




```r
cor(data$wfir,data$density)
```

```
## [1] 0.5459741
```

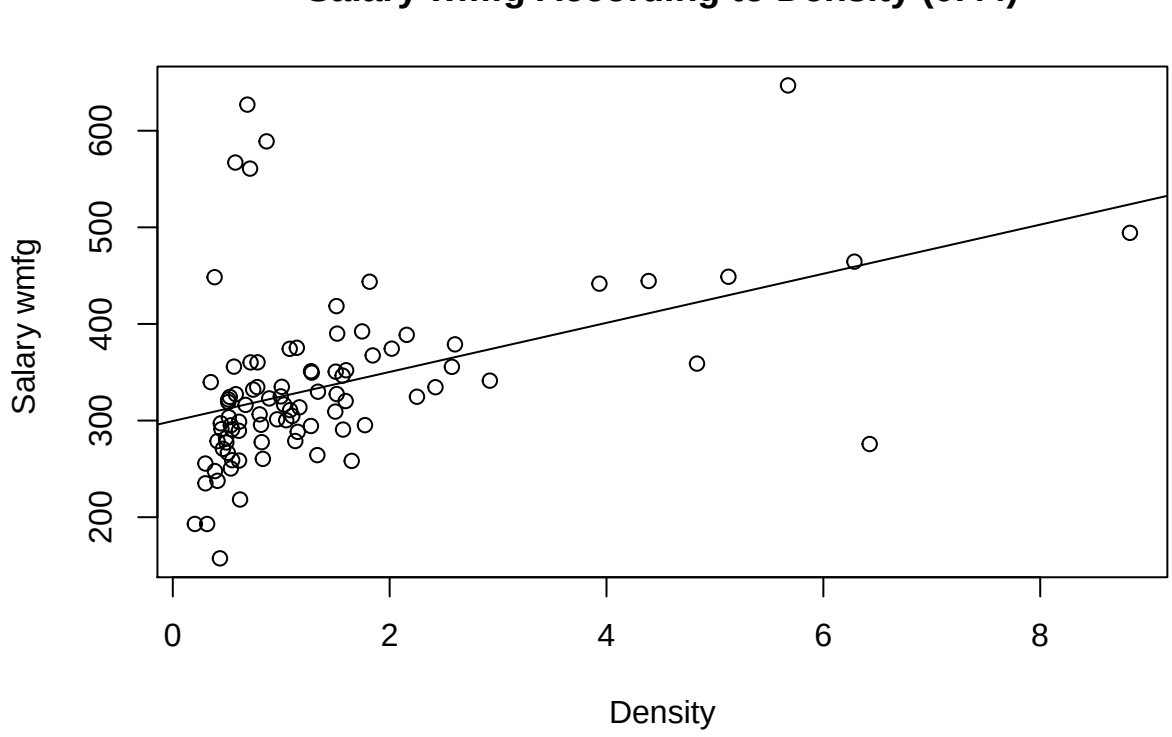
```r
plot(data$wser~data$density, ylab = "Salary wser ", xlab = "Density", main="Salary wser According to Den
abline(lm(data$wser~data$density))
```




```
cor(data$wser,data$density)
```

```
## [1] 0.04344734
```

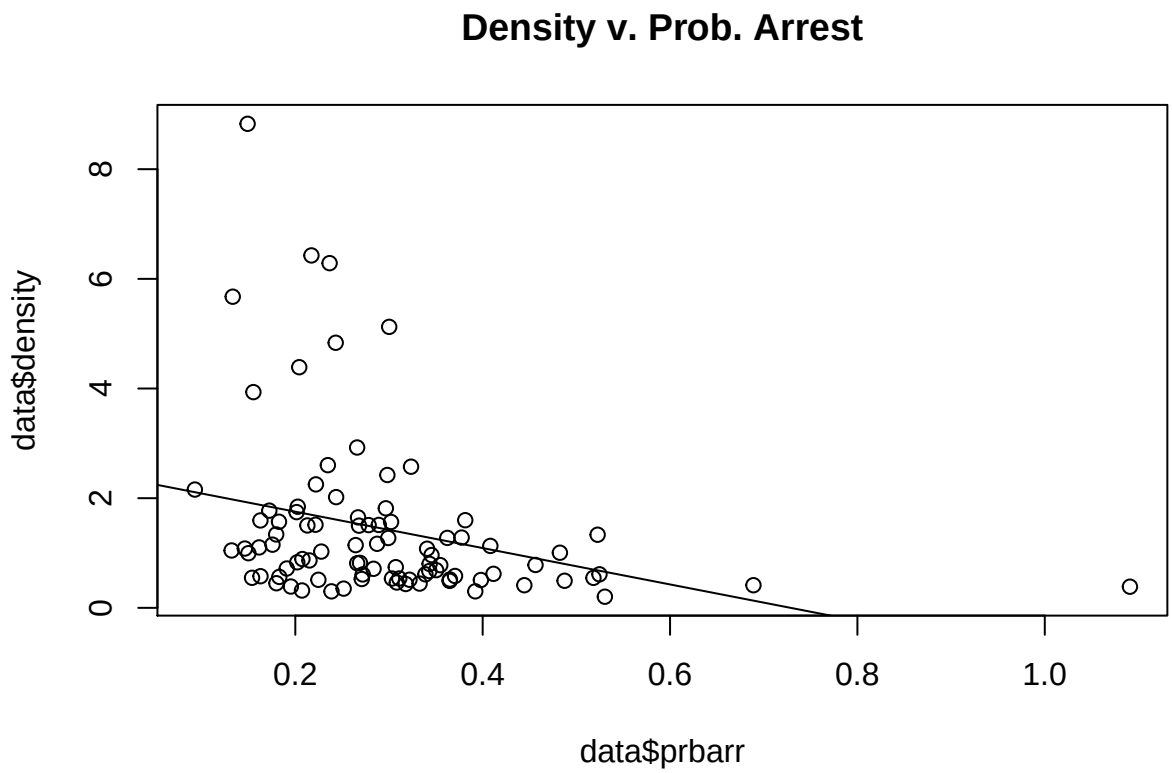
```
plot(data$wmfg~data$density, ylab = "Salary wmfg ", xlab = "Density", main="Salary wmfg According to Den
abline(lm(data$wmfg~data$density))
```



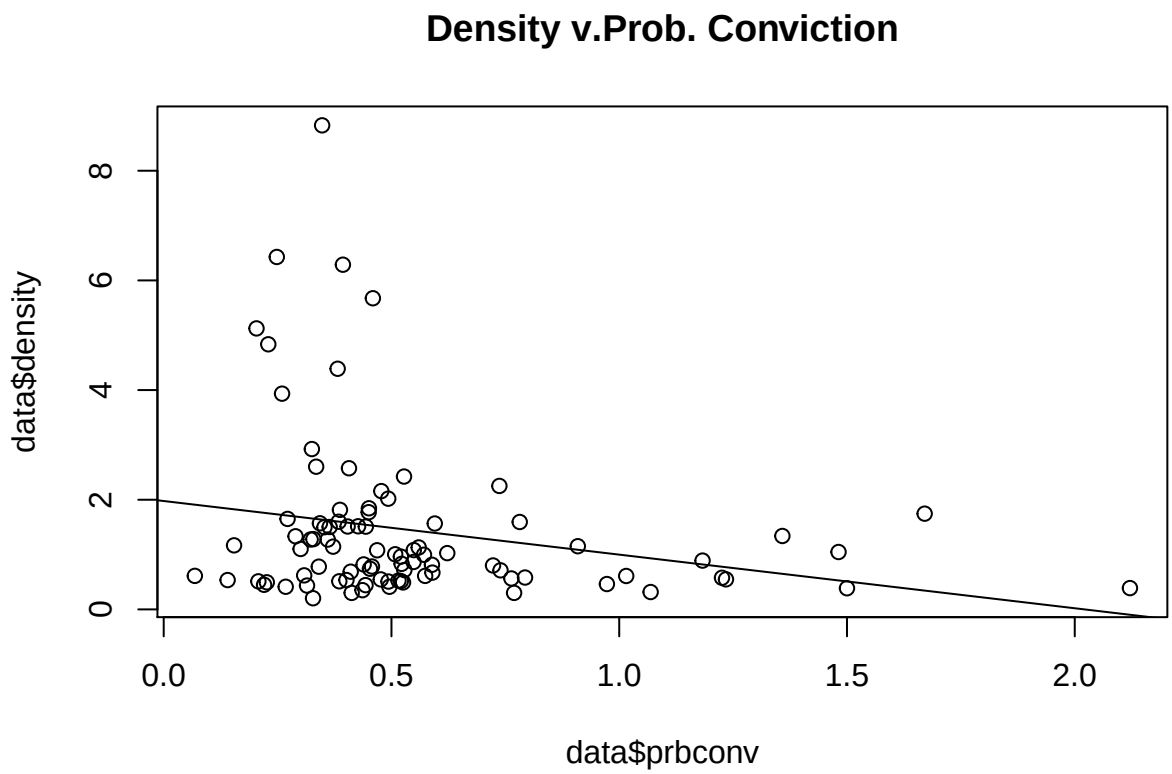
```r
cor(data$wmfg,data$density)
```

```
## [1] 0.4376621
```

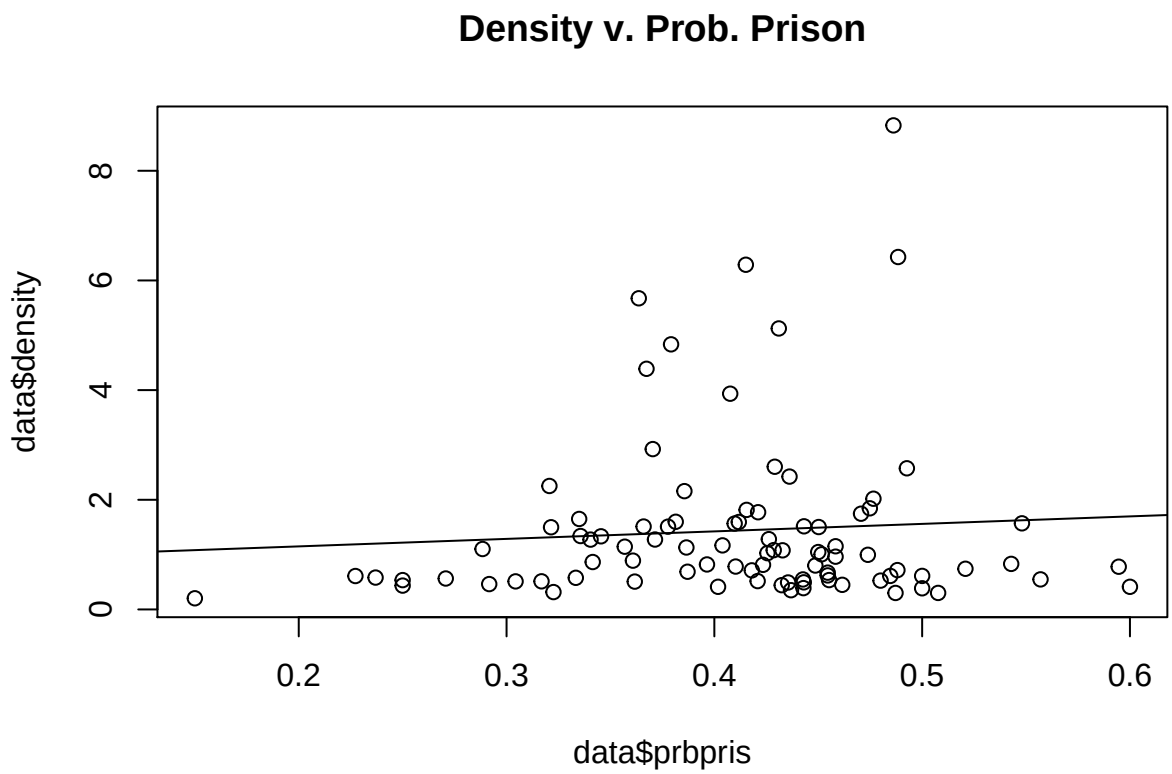
```r
plot(data$prbarr,data$density, main="Density v. Prob. Arrest")
abline(lm(data$density ~ data$prbarr))
```



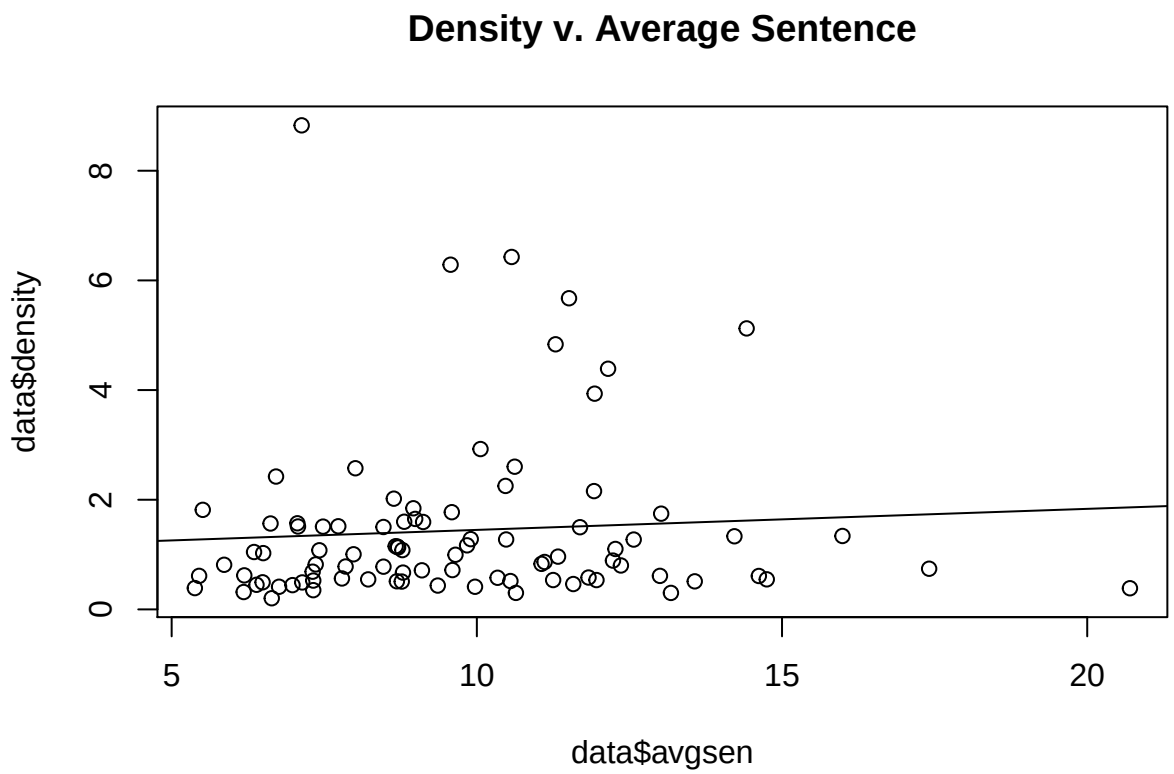

```r
plot(data$prbconv,data$density, main="Density v.Prob. Conviction")
abline(lm(data$density ~ data$prbconv))
```



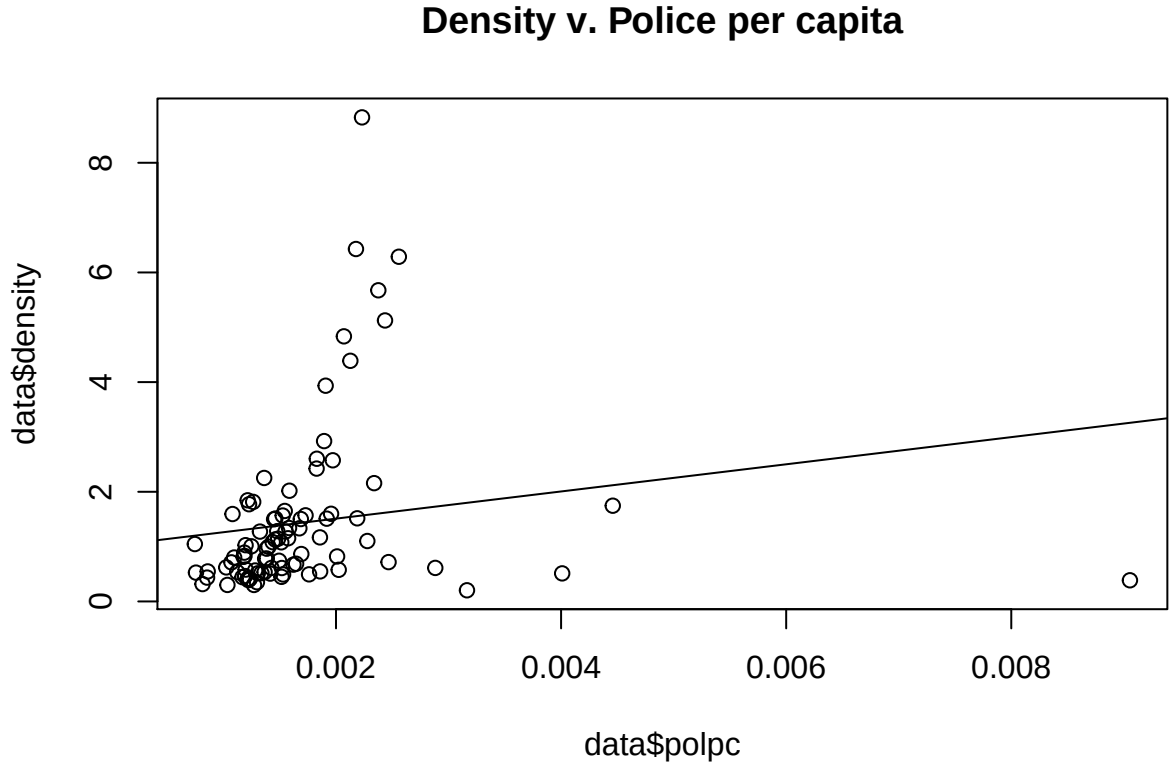

```
plot(data$prbpris,data$density, main="Density v. Prob. Prison")
abline(lm(data$density ~ data$prbpris))
```




```
plot(data$avgsen,data$density, main="Density v. Average Sentence")
abline(lm(data$density ~ data$avgsen))
```



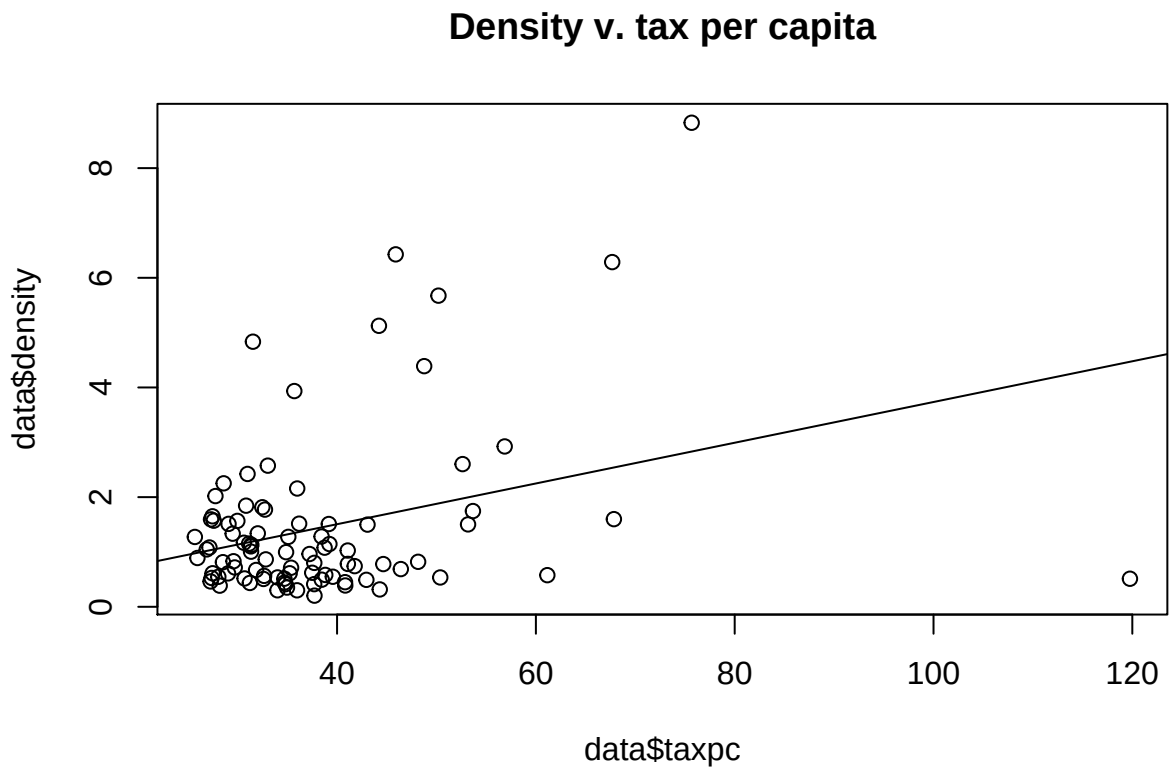

```
plot(data$polpc,data$density, main="Density v. Police per capita")
abline(lm(data$density ~ data$polpc))
```



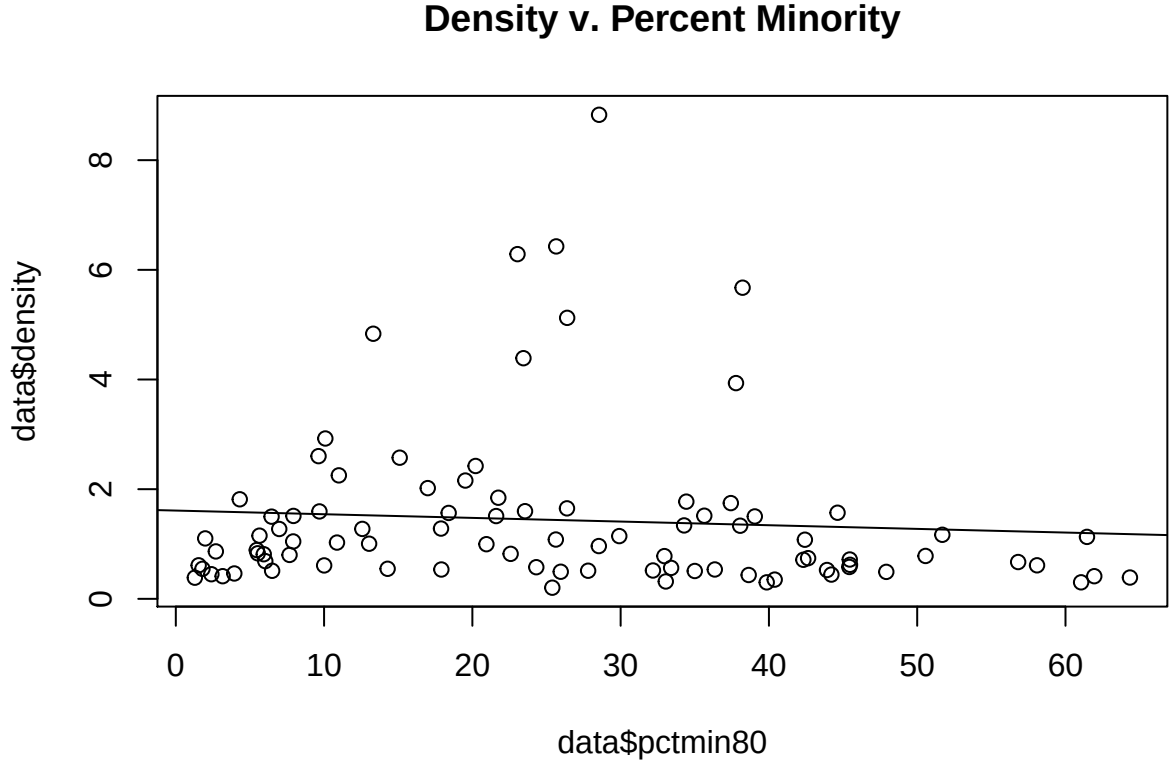

```
cor(data$density,data$polpc )
```

```
## [1] 0.1615286
```

```
plot(data$taxpc,data$density, main= "Density v. tax per capita")
abline(lm(data$density ~ data$taxpc))
```



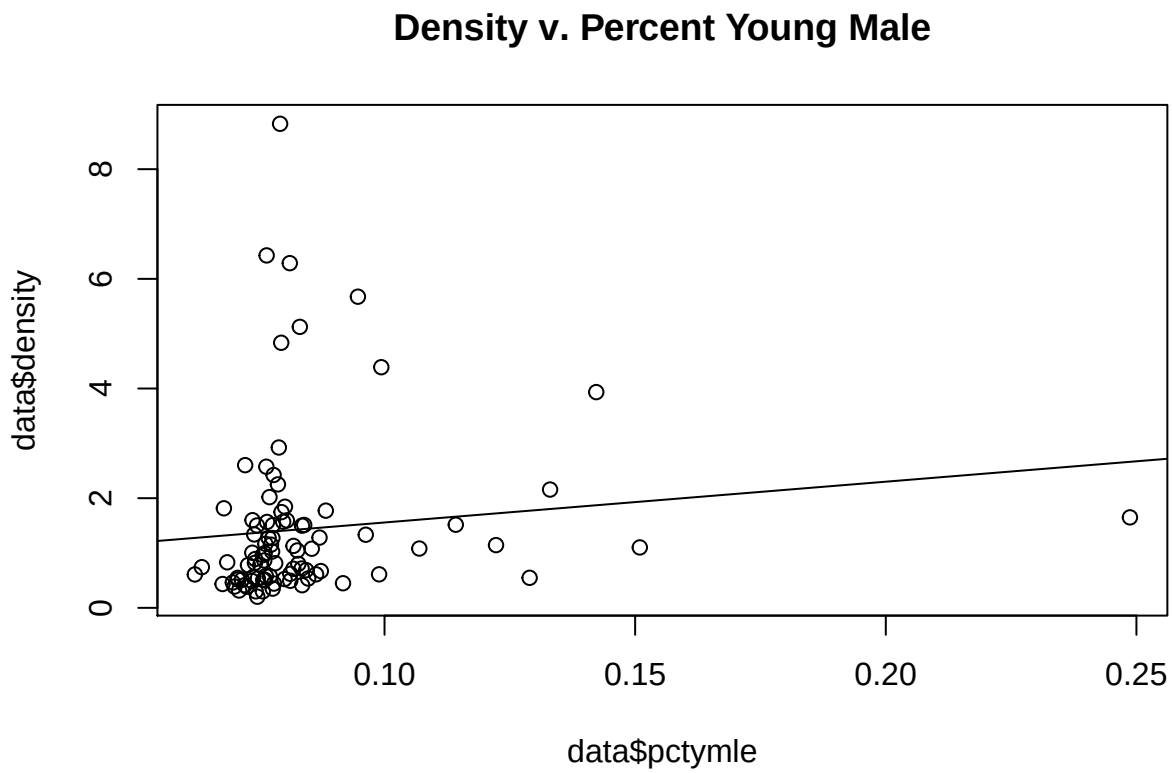

```
plot(data$pctmin80,data$density, main="Density v. Percent Minority")
abline(lm(data$density ~ data$pctmin80))
```



```r
cor(data$density,data$pctmin80 )
```

```
## [1] -0.07470698
```

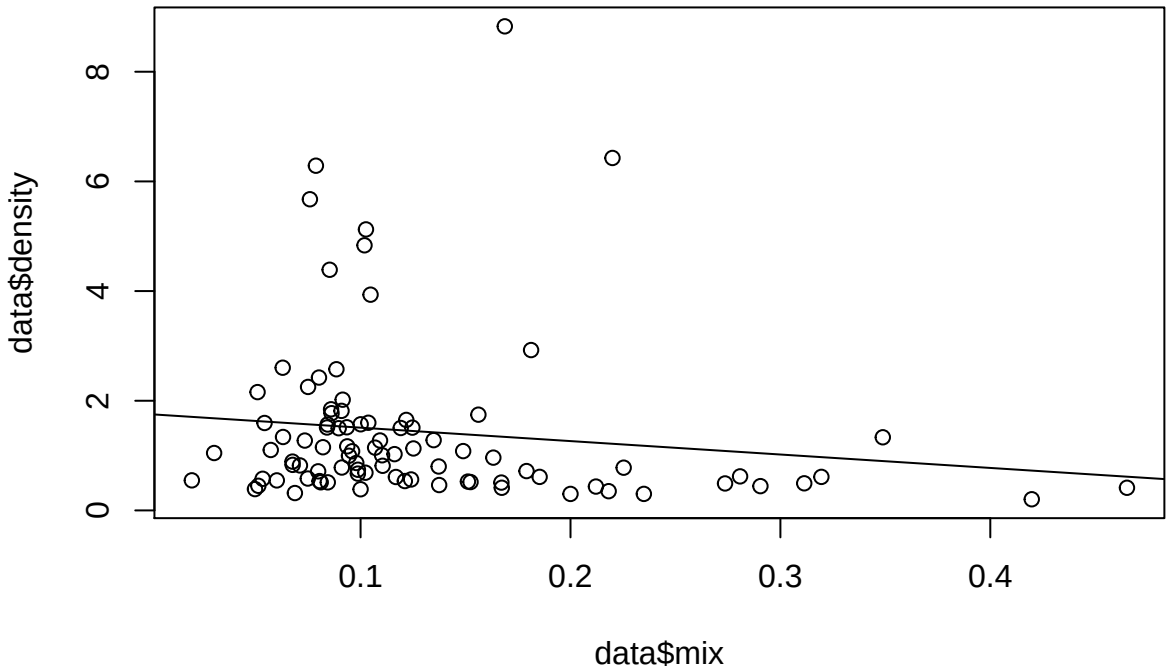
```r
plot(data$pctymle,data$density, main="Density v. Percent Young Male")
abline(lm(data$density ~ data$pctymle))
```




```r
cor(data$density,data$pctymle )
```

```
## [1] 0.1147814
```

```r
plot(data$mix,data$density, main="Density v. Offense Mix")
abline(lm(data$density ~ data$mix))
```




```
cor(data$density,data$mix )
```

```
## [1] -0.1317277
```