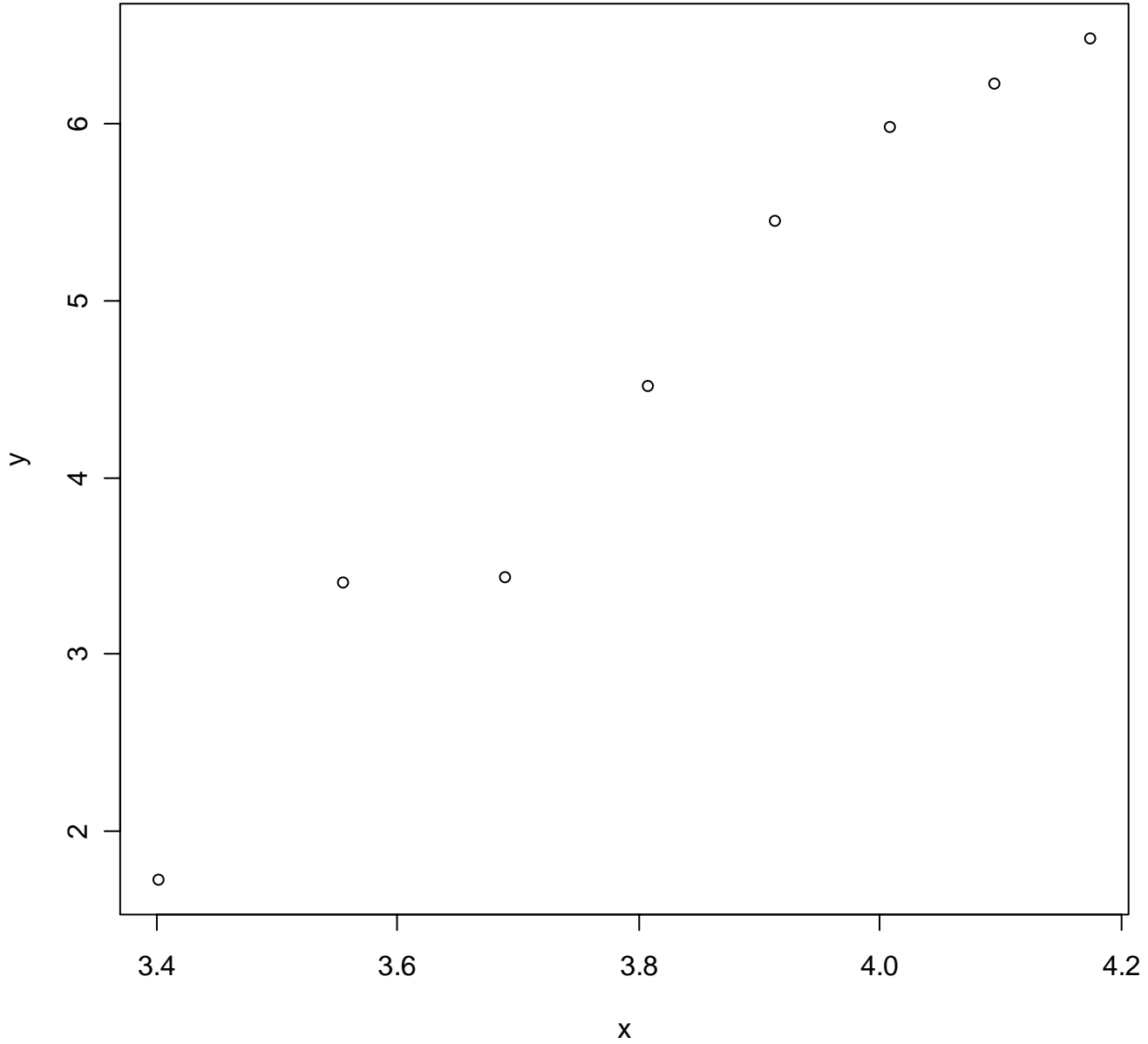


GLM Exercises

Exercise D3.5.

```
> y <- c(5.6,30.2,31.1,91.7,231.8,394,504.4,654.4)
> x <- c(30,35,40,45,50,55,60,65)
> y <- log(y)
> x <- log(x)
> y
[1] 1.722767 3.407842 3.437208 4.518522 5.445875 5.976351 6.223370 6.483719
> x
[1] 3.401197 3.555348 3.688879 3.806662 3.912023 4.007333 4.094345 4.174387
> heart <- data.frame(cbind(x,y))
> M1 <- glm(y ~ x, data=heart)
> summary(M1)
Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -18.9330      1.7436  -10.86 3.61e-05 ***
x              6.1579      0.4543   13.56 1.00e-05 ***
> exp(predict(M1))
      1          2          3          4          5          6          7          8
7.47298 19.30839 43.93952 90.75026 173.62744 312.25599 533.59200 873.51672
> n <- c(17742,16554,16059,13083,10784,9645,10706,9933)
> d <- exp(predict(M1))*n/100000
> d
      1          2          3          4          5          6          7          8
1.325856 3.196311 7.056247 11.872856 18.723983 30.117090 57.126360 86.766415
> plot(x,y)
```



Exercise D4.2 (c)(d)

```
> leuk <- read.table(file="Table4.6.txt", header=T)
> leuk
      y      x
1    65 3.36
2   156 2.88
3   100 3.63
4   134 3.41
5    16 3.78
6   108 4.02
7   121 4.00
8     4 4.23
9    39 3.73
10  143 3.85
11   56 3.97
12   26 4.51
13   22 4.54
14    1 5.00
15    1 5.00
16    5 4.72
17   65 5.00
# THE EXPONENTIAL DISTRIBUTION IS OBTAINED BY USING THE
# FAMILY GAMMA, AND THEN LATER IN summary WRITING
# dispersion=1 WHICH GIVES THE EXPONENTIAL DISTRIBUTION.
# REMARK THAT THE ESTIMATES OF beta1, beta2 etc ARE NOT
# AFFECTED BY THE DISPERSION PARAMETER.
> M1 <- glm(y ~ x, data=leuk, family=Gamma(link="log"))
> summary(M1,dispersion=1)
```

```

Call:
glm(formula = y ~ x, family = Gamma(link = "log"), data = leuk)
Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.9922 -1.2102 -0.2242  0.2102  1.5646
Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  8.4775      1.6548   5.123 3.01e-07 ***
x           -1.1093      0.3997  -2.776 0.00551 **
(Dispersion parameter for Gamma family taken to be 1)
Null deviance: 26.282  on 16  degrees of freedom
Residual deviance: 19.457  on 15  degrees of freedom
AIC: 173.97
Number of Fisher Scoring iterations: 8
> yhat <- predict(M1,type="response")
> resid <- (leuk$y-yhat)/yhat
> plot(resid)
> compare <- cbind(leuk$y,yhat)
> compare
      yhat
1   65 115.61387
2  156 196.90443
3  100  85.69083
4  134 109.37596
5   16  72.55546
6  108  55.59648
7  121  56.84373
8    4  44.04305
9   39  76.69343
10 143  67.13466
11  56  58.76725
12  26  32.28376
13  22  31.22708
14   1  18.74654
15   1  18.74654
16   5  25.57492
17  65  18.74654

```