# HW4 - Lucas Fellmeth, Sven Bergmann

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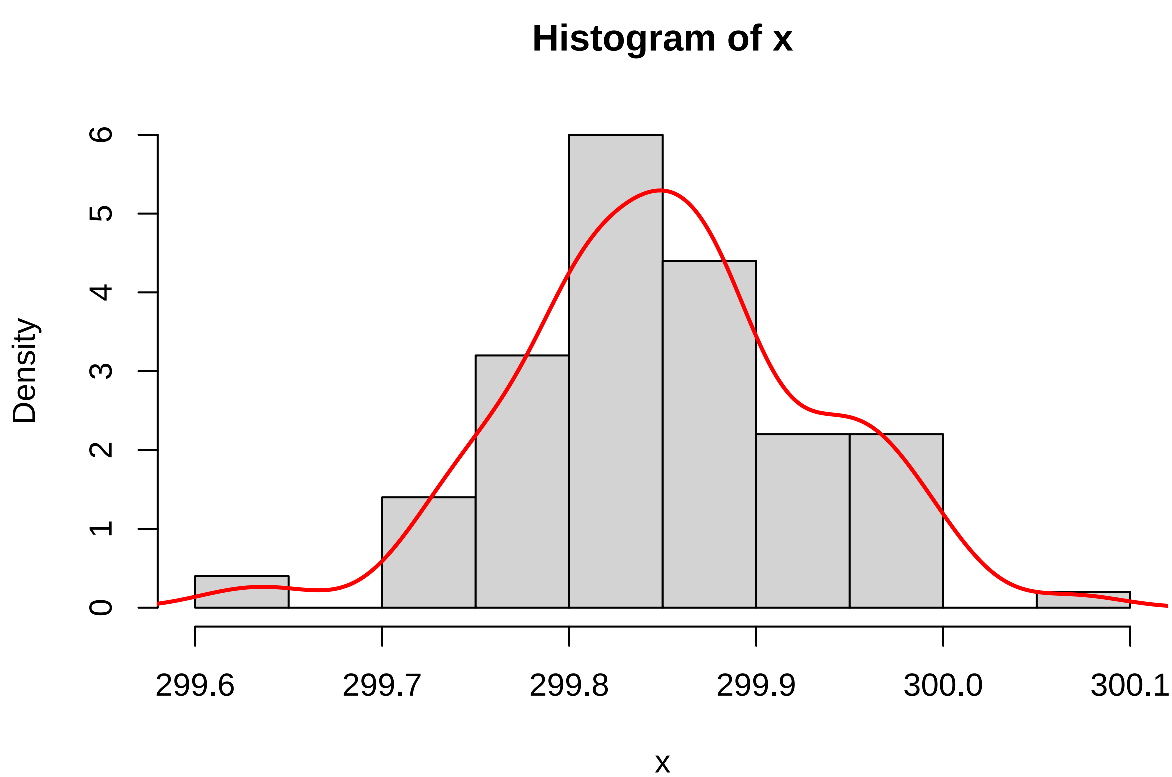
## Chapter 11

### Exercise 5

Recall Exercise 6.3 based on 100 measurements of the speed of light in air. In that chapter, we tested the data for normality. Use the same data to construct a density estimator that you feel gives the best visual display of the information provided by the data. What parameters did you choose? The data can be downloaded from http://www.itl.nist.gov/div898/strd/univ/data/Michelso.dat

```
x <- as.numeric(read.delim2("Michelso.dat.txt")[[1]])
hist(x, freq = F, nclass = 10)
kde <- density(x, bw = "SJ")
lines(kde$x, kde$y, col = "red", lwd = 2)
```



# Chapter 12

## Exercise 1

Using robust regression, find the intercept and slope $\tilde{\beta}_0$ and $\tilde{\beta}_1$ for each of the four data sets of Anscombe (1973) from p. 244. Plot the ordinary least-squares regression along with the rank regression estimator of slope. Contrast these with one of the other robust regression techniques. For which set does $\tilde{\beta}_1$ differ the most from its LS counterpart $\hat{\beta}_1 = 0.5$? Note that in the fourth set, 10 out of 11 Xs are equal, so one should use

$$S_{ij} = (Y_j - Y_i)/(X_j - X_i + \epsilon)$$

to avoid dividing by 0. After finding $\tilde{\beta}_0$ and $\tilde{\beta}_1$, are they different than $\hat{\beta}_0$ and $\hat{\beta}_1$? Is the hypothesis $H_0 : \beta_1 = 1/2$ rejected in a robust test against the alternative $H_1 : \beta_1 < 1/2$, for data set 3? Note here $\beta_{10} = 1/2$.

Exercises 11.5 and 12.1 (here, for each data set, compare the least squares estimator with the least median of squares estimator and the M-estimator with Tukey's bisquare function). Due Wednesday Nov 8.