STAT 2300 - Homework 8

Reading

Read Chapter 8 and Chapter 9

Conceptual Exercises

(don't hand these in - answers are at the end of the chapter)

- Chapter 8 # 2, 10, 11
- Chapter 9 # 6, 7, 11

R Exercises

Ch 8 # 17

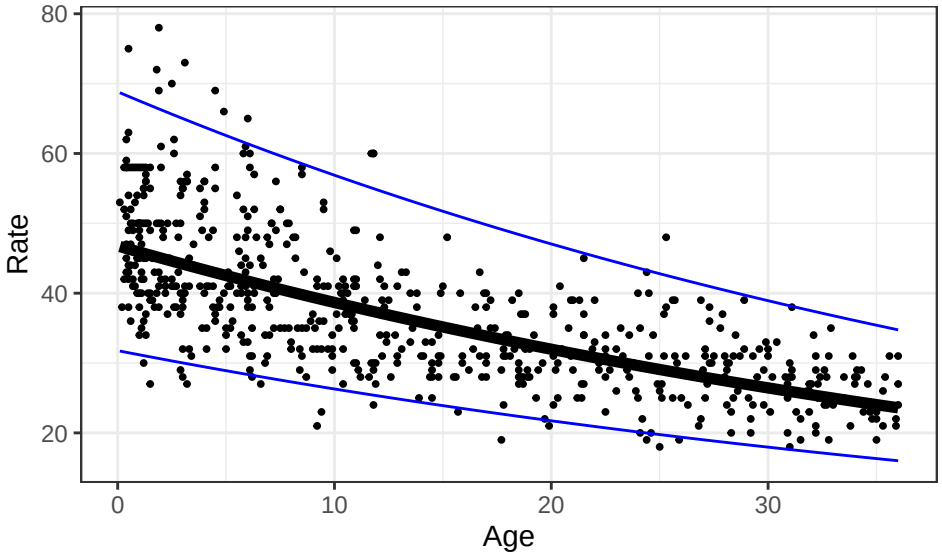
For part (a), it's pretty clear the Load variable benefits from a log transformation, but what about Mass? Make plots of log(Load) against Mass, log(Mass), and the cube root of Mass ($\text{Mass}^{1/3}$). The cube root is a reasonable thing to try because Mass is naturally the cube of the plant size.

For (b) and (c) just fit the best looking model and make the four diagnostic plots using `plot()`.

Ch 8 # 26

Ch 8 # 24

The goal of this problem is to make a useful chart that a physician can use to see normal respiration rate for children age 0-36 months:



To get this, fit a model of log(Rate) on Age. Then use `predict` with `interval = 'prediction'` to create `fit`, `lwr`, and `upr` for each Age. Join that prediction to the original data with `cbind`, then plot the points and all three prediction lines. You'll need to exponentiate the predictions since the model was fit to log(Rate).

Ch 9 # 12

The data is `case0902`.

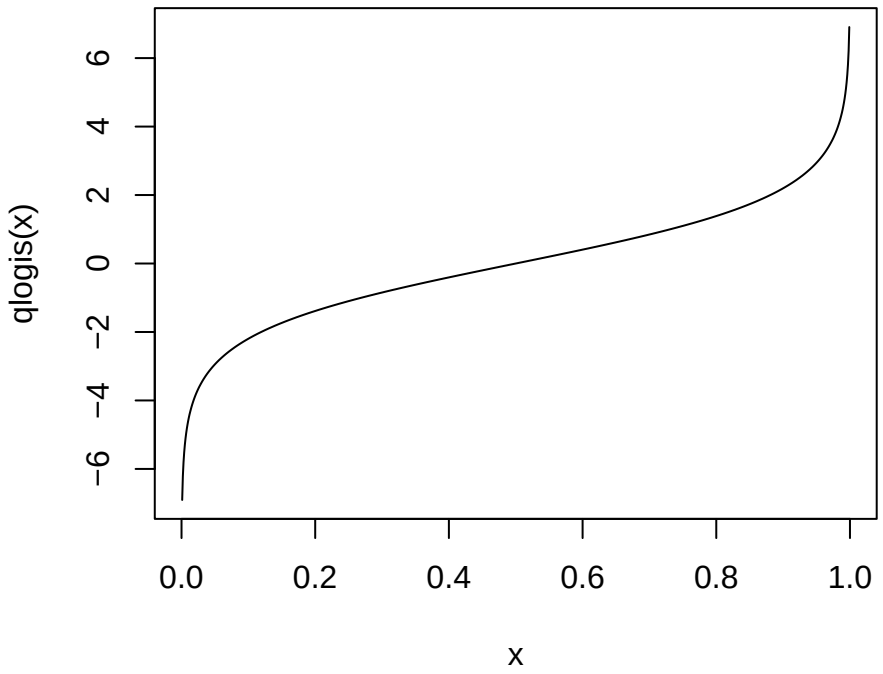
Ch 9 # 21

Make a pairs plot of the logs of all three variables (Weight, Ingestion, Organic) before fitting the model.

Ch 9 # 16

The logit function is built in to R, but it's called `qlogis`. It looks like this:

```
x <- seq(0, 1, .001)
plot(x, qlogis(x), type='l')
```



Ch 9 # 18

Part (a) hint: You'll need `pivot_longer` here to create variables `Wingsize` and `Sex`.

Part (b): Instead of this confusing thing, make a model `Wingsize ~ Latitude * Continent + Sex`. This gives the wing size as a linear function of latitude. It controls for Sex by adding a constant. It allows the line to vary in slope and intercept by continent.

The interesting question is whether there is a difference in the wing size – latitude relationship between the two continents, NA and EU. Is there?