ST2304 Continuation Exam

Introduction

This is for an oral exam. You will be expected to give a short (5 minutes?) presentation on this problem, and then we will discuss what you did, as well as other parts of the course. We do not expect the presentation to be polished: if you find it easiest to make a Word or Markdown document and present from that, then go ahead. We also do not you to present a complete solution. This is intended to start a discussion, so be prepared to explain what you would do if you have time.

If you have technical problems (e.g. reading the data), contact me. The code below should work to get the data into R.

The Problem

One question in the 2023 exam was about changes in body size of birds over time. Here we will look at a different part of the same problem: does body size change in mammals, in particular in the genus *Sorex* (shrews). The data for this was collected to see if the variance changes over time. We have not looked at models for variance in the course, so you do not need to delve into this further.

An Ornate shrew *Attribution: Pacific Southwest Region U.S. Fish and Wildlife Service, Public domain, via Wikimedia Commons*

```
SorexData <- read.csv("https://www.math.ntnu.no/emner/ST2304/2023v/SorexData.csv")
SorexData$Colour <- as.numeric(as.factor(SorexData$Species))
plot(SorexData$Year, SorexData$mean, col=SorexData$Colour,
     xlab="Year", ylab="Body Size")
```
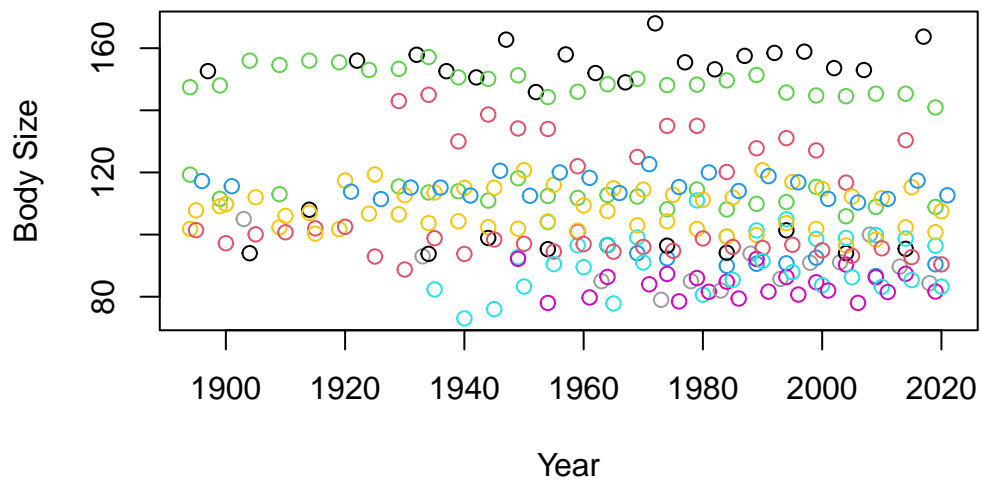

The data has the following columns:

- Species: Species name
- Year: Year
- mean: mean body size (mm)

Each year might have more than one observation, so we use the mean.

To start you off (so you are not struggling with syntax too much), here is an initial model:

```
initialmodel <- lm(y ~ x1 + x2, data=Data)
```

Initially, you should look at the following problems:

- does body size change over time in North American shrews?
- does any change vary between species?

You should think about the following:

- how well does the model fit the data?
- are the assumptions of your model met?
- can you improve your model?

You may not end up with the ideal model, as long a you can explain what problems you think might still have to be dealt with.