

MAS115 R programming, Homework Solutions 6

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1 Producing a plot of bodyweight vs. brainweight

Here is the R code which I used to produce the picture.

```
library(MASS)
Animals

pdf("BrainBodyRegression.pdf", width = 8, height = 6)
plot(log(brain) ~ log(body), data = Animals, ylim = c(0,10), asp=1,
     ylab = "Log of brainweight in g",
     xlab = "Log of bodyweight in kg",
     main = "Body and brainweights for 28 species of animal",pch = 19)

abline(lm(log(brain) ~ log(body), data = Animals))

#identify(log(Animals$body), log(Animals$brain), labels = row.names(Animals))

Dino <- c(6,16,26)
text(log(Animals$body)[Dino], log(Animals$brain)[Dino],
     labels = row.names(Animals)[Dino], pos = 2)

ModernAnimals <- Animals[-Dino,]
abline(lm(log(brain) ~ log(body), data = ModernAnimals), col = "red", lty = 2)

legend("topleft", legend = c("All Animals", "Modern Animals"), lty = c(1,2),
     col = c("black", "red"))
dev.off()
```

Note: Initially I used the *commented-out* `identify` to identify the three outliers and had no `text` command. When I ran the `identify` version it told me these were the 6th, 16th and 26th rows in the dataframe. I then used these as the labels in the `text` command in the final version. A slicker version is to use

```
Dino <- identify(log(body), log(brain), labels = row.names(Animals), plot = FALSE)
```

to identify the points without labelling them while saving their indices to automate construction of the final plot.

In case you didn't realise, the three outlying animals were dinosaurs and extinct a long time ago. All of the other animals are 'extant', that is currently alive. The fit of the data to our relationship is actually pretty good and people do think there is a relationship of the form described between bodyweight and brainweight.

Why might it be worth specifying `asp=1`? That means that the scales on the two axes are the same, and so the apparent slope of a plotted regression line corresponds to its 'actual' slope—the value of β in the equation in the handout. For example, if brain weight were proportional to body weight (in reality it isn't that simple, even for modern animals), then we would have $\beta = 1$ in the equation, and `asp=1` would ensure that the line in the figure had slope 1 too.

Body and brainweights for 28 species of animal

