Lab 1

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Question 1

Script

```
females <- c(3,2,1,5,4,3)
males <- c(2,5,3,4,1,2)

#sex ratio of first mother
females[1] / (females[1] + males[1])

#sex ratio for all mothers
(ratios <- females / (females + males))

#avg sex ratio
mean(ratios)
```

Output

```
## [1] 0.6
## [1] 0.6000000 0.2857143 0.2500000 0.5555556 0.8000000 0.6000000
## [1] 0.5152116
```

Answers

Do red deer appear to have an equal sex ratio at birth?

The ratio appears to be equal to .5, but to check we should do a binomial test.

```
binom.test(sum(females),sum(c(females,males)))
```

```
##
##  Exact binomial test
##
## data:  sum(females) and sum(c(females, males))
## number of successes = 18, number of trials = 35, p-value = 1
## alternative hypothesis: true probability of success is not equal to 0.5
## 95 percent confidence interval:
##  0.3398914 0.6861715
## sample estimates:
## probability of success
##              0.5142857
```

With a p-value of 1, we cannot reject the null hypothesis that the true sex ratio is .5

Question 2

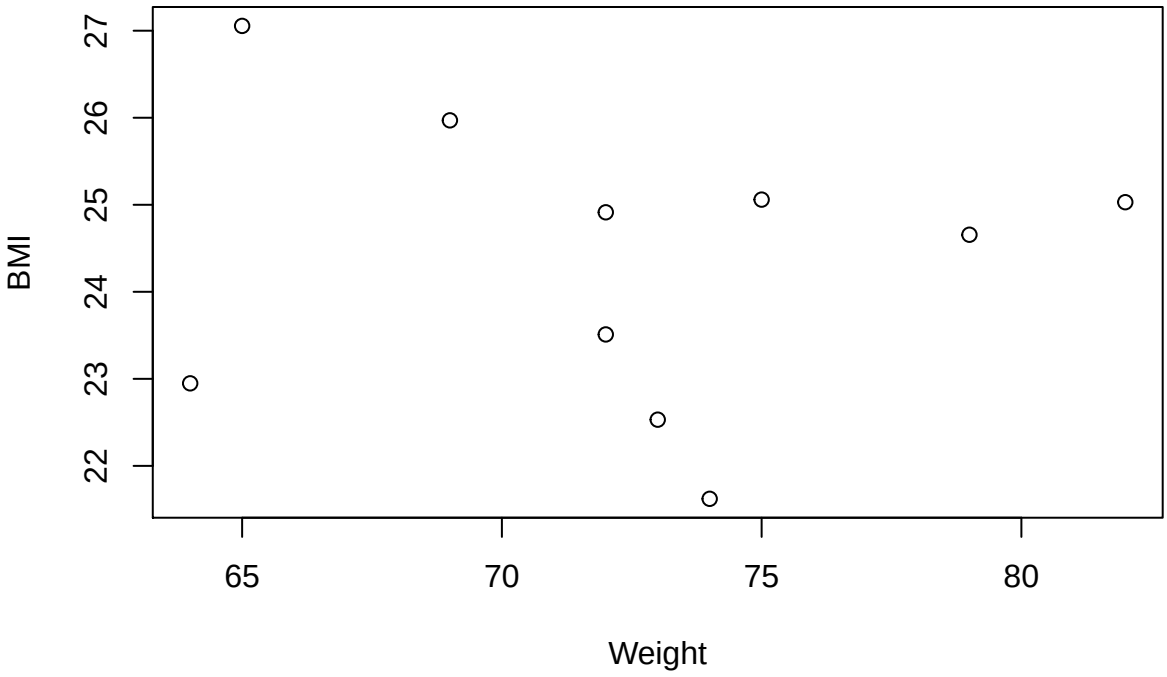
Script

```
getwd()
setwd('.')
rm(list = ls())
bmi <- read.csv("bmi.csv")
dim(bmi)
names(bmi)
mean(bmi$weight)
bmi$bmi <- bmi$weight / (bmi$height/100)^2

plot(bmi$weight,bmi$bmi, xlab="Weight", ylab="BMI")
```

Output

```
## [1] "/home/adam/code/biometry-lab/lab1"
## [1] 10  2
## [1] "height" "weight"
## [1] 72.5
```



Answers

Does BMI appear to depend on weight?

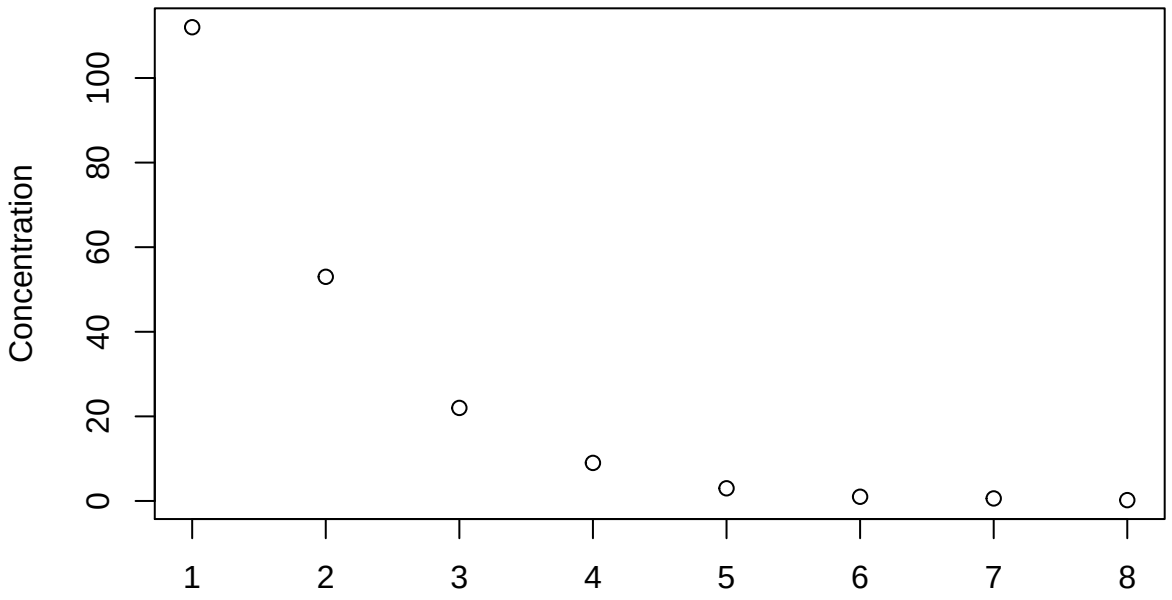
No, BMI does not appear to depend on weight. In this dataset, there is no clear correlation.

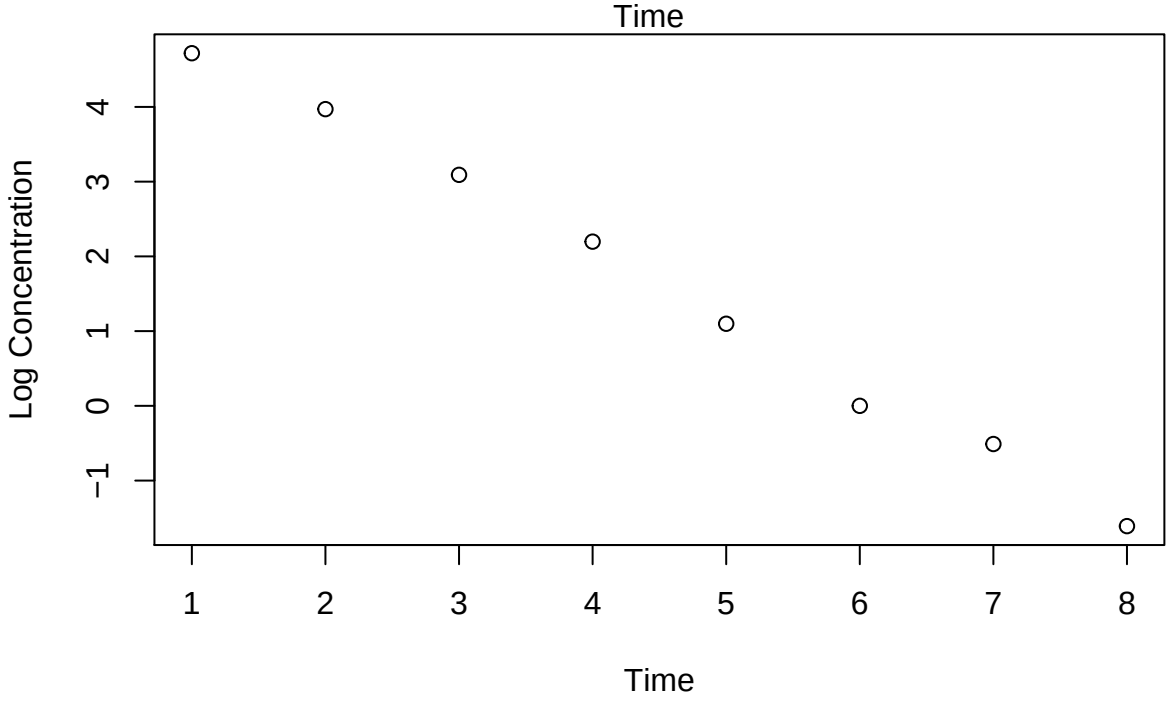
Question 3

Script

```
toxin <- read.csv("toxin.csv")
plot(toxin$Time,toxin$Concentration,xlab = "Time", ylab = "Concentration")
plot(toxin$Time,log(toxin$Concentration), xlab = "Time", ylab = "Log Concentration")
```

Output





Answers

How do the two plots compare?

The first plot shows a curve, which appears to be a logarithmic decrease in concentration over time. The second plot shows that the decrease is linear after a log transform.

Question 4

Script

```
lizards <- read.csv("lizards.csv")
maleweight <- lizards$Weight[lizards$Sex == "male"]
femaleweight <- lizards$Weight[lizards$Sex == "female"]
(meanmale <- mean(maleweight))
(meanfemale <-mean(femaleweight))

barplot(c(meanmale,meanfemale),names.arg = c("Male","Female"))
```

Output

```
## [1] 0.91
## [1] 1.32
```

Answers

Does one sex seem bigger?

Females seem larger than males. To test this we can use a t-test.

```
t.test(femaleweight,maleweight, alternative="greater")
```

```
##
##  Welch Two Sample t-test
```

```
##
## data:  femaleweight and maleweight
## t = 3.9191, df = 15.951, p-value = 0.0006149
## alternative hypothesis: true difference in means is greater than 0
## 95 percent confidence interval:
##  0.227319      Inf
## sample estimates:
## mean of x mean of y
##      1.32      0.91
```

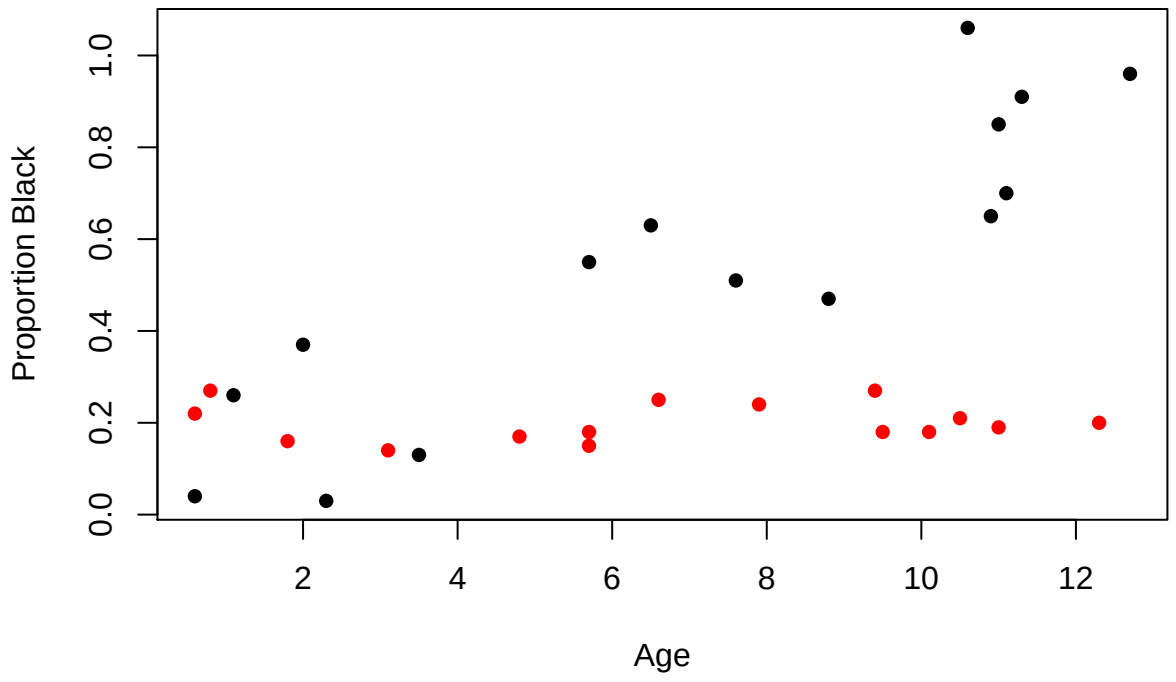
The T-test supports the assertion that females are bigger than males.

Question 5

Script

```
lions <- read.csv("lions.csv")
maleage <- lions$Age[lions$Sex == "male"]
maleproportion <- lions$Black[lions$Sex == "male"]
femaleage <- lions$Age[lions$Sex == "female"]
femaleproportion <- lions$Black[lions$Sex == "female"]
plot(maleage, maleproportion, pch=16, col="black", xlab = "Age", ylab = "Proportion Black")
points(femaleage, femaleproportion, pch=16, col="red")
```

Output



Answers

Based on these plots, what can you say about the usefulness of nose pigmentation for estimating lion age?

Nose pigmentation is a good estimator of lion age for male lions, but not for female lions.