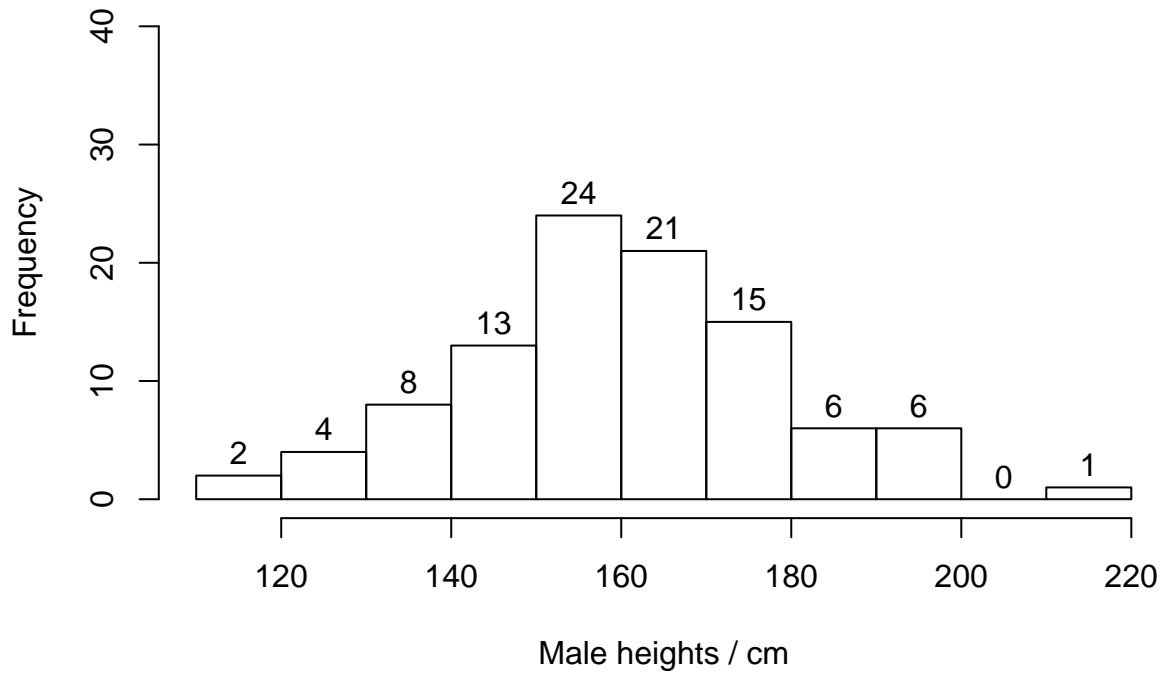


Bios 301: Assignment 4

Question 1

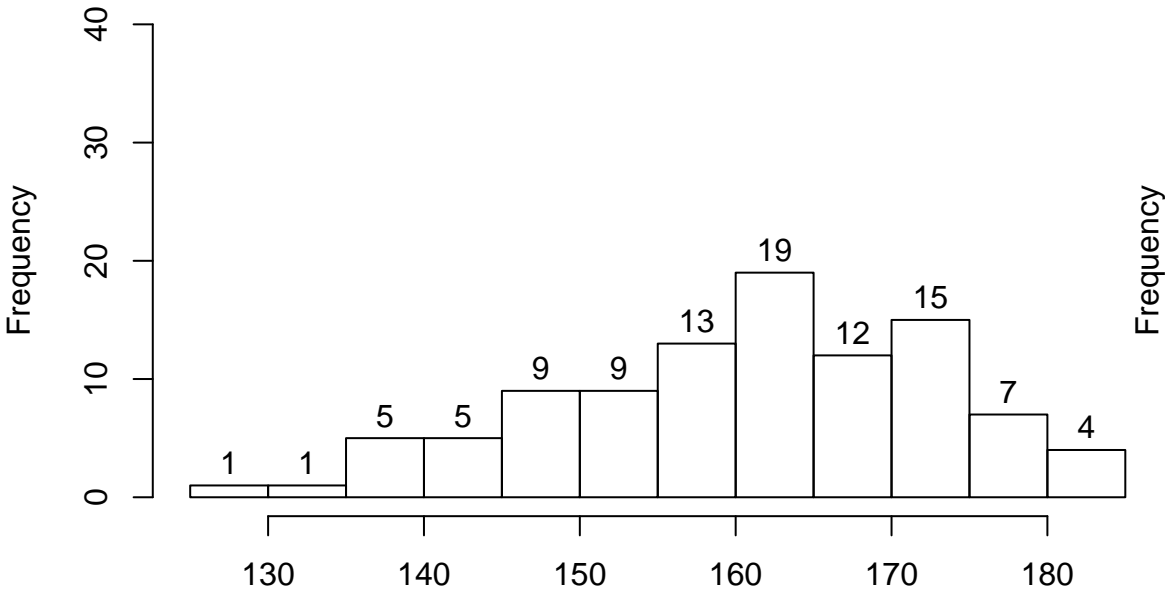
```
pop <- data.frame(m = rnorm(100, 160, 20), f = rnorm(100, 160, 20))
next_gen <- function(pop) {
  pop$m <- sample(pop$m)
  pop$m <- rowMeans(pop)
  pop$f <- pop$m
  pop
}
gen <- 1
hist(pop$m, main = paste("Histogram of generation" , gen), ylim = range(0,40), xlab="Male heights / cm", lab
```

Histogram of generation 1

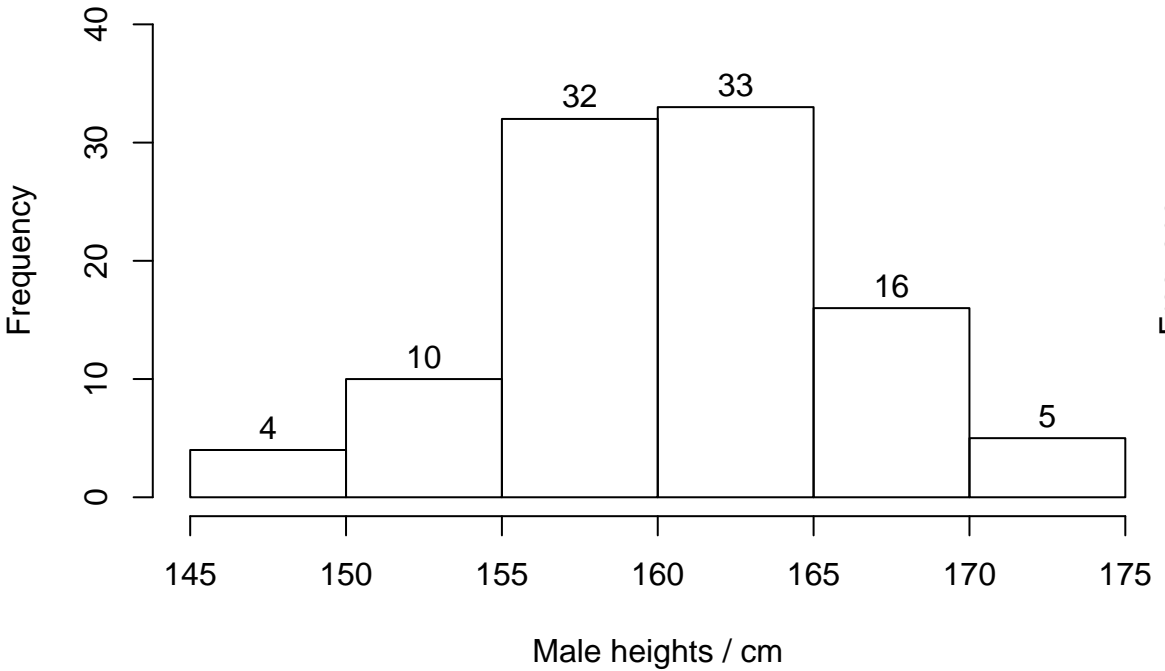


```
while(gen < 9){
  pop <- next_gen(pop)
  gen<-gen+1
  hist(pop$m, main = paste("Histogram of generation" , gen), ylim = range(0,40), xlab="Male heights / cm", lab
}
```

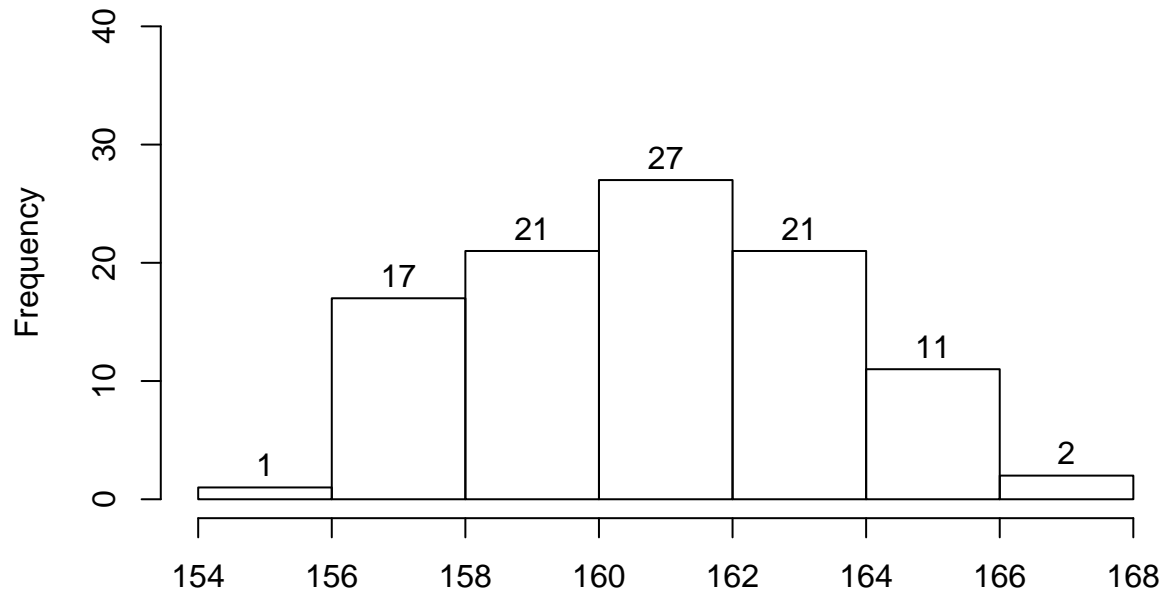
Histogram of generation 2



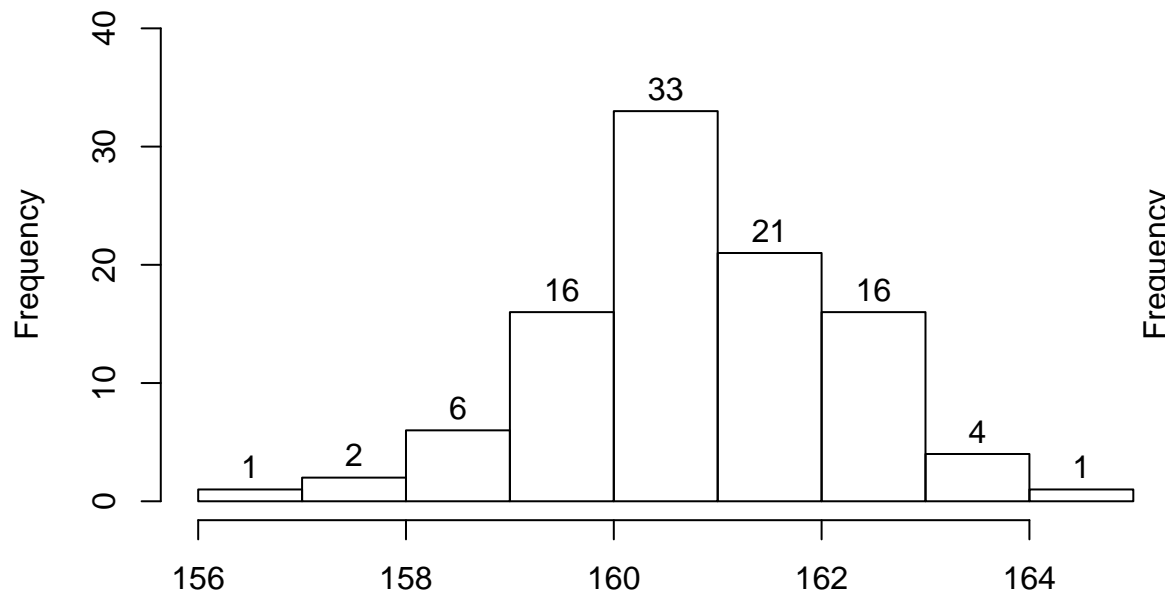
Histogram of generation 4



Histogram of generation 6



Histogram of generation 8



Question 2

```
library(ggplot2)
pop <- data.frame(m = rnorm(100, 160, 20), f = rnorm(100, 160, 20))
```

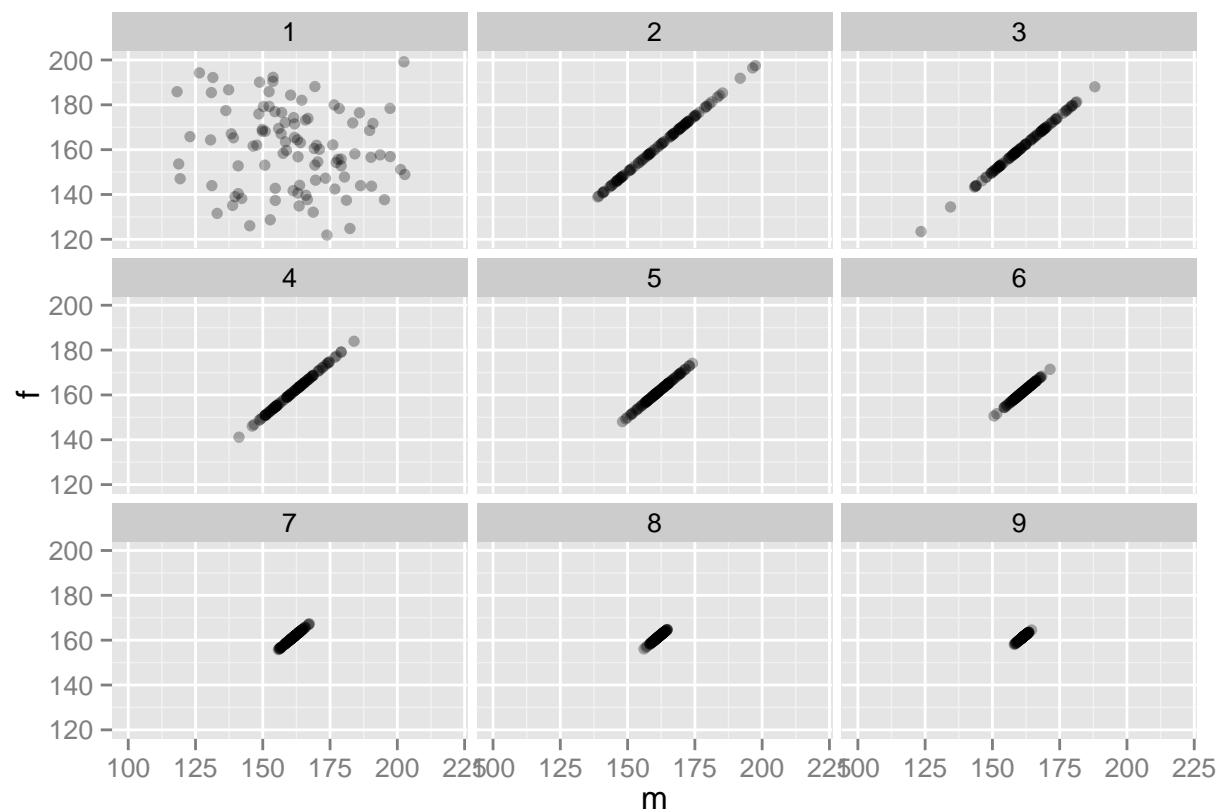
```

next_gen <- function(pop) {
  pop$m <- sample(pop$m)
  pop$f <- rowMeans(pop)
  pop$f <- pop$m
  pop
}
temp <- pop
gen <- 1
pop<-cbind(pop,gen)
while(gen < 9){
  temp <- next_gen(temp)
  gen<-gen+1
  pop <- rbind(pop,cbind(temp,gen))
}
ggplot(pop, aes(x=m, y=f))+geom_point(alpha=0.3)+facet_wrap(~ gen)+xlim(100,220)+ylim(120,200)

```

Warning: Removed 4 rows containing missing values (geom_point).

Warning: Removed 1 rows containing missing values (geom_point).



Question 3

```

set.seed(1000)
results <- data.frame(matrix(NA, nrow = 1000, ncol = 4))
names(results) <- c("mean", "lower", "upper", "contains mean")
count <- 0

```

```

for(i in 1:1000){
  x <- runif(100, -1, 1)
  results$mean[i] <- mean(x)
  s <- sd(x)
  results$lower[i] <- results$mean[i]-1.96*s/sqrt(100)
  results$upper[i] <- results$mean[i]+1.96*s/sqrt(100)
  if(results$lower[i] <= 0 && results$upper >= 0){
    results[i,"contains mean"] <- 1
    count <- count+1
  } else{
    results[i,"contains mean"] <- 0
  }
}
cat("Number of trials: 1000\n")

```

```
## Number of trials: 1000
```

```
results[1:10,]
```

```

##      mean      lower      upper contains mean
## 1 -0.043110 -0.153813  0.06759          1
## 2  0.103043 -0.008697  0.21478          1
## 3  0.031545 -0.073203  0.13629          1
## 4  0.075548 -0.039569  0.19067          1
## 5 -0.097874 -0.214503  0.01876          1
## 6  0.035813 -0.083671  0.15530          1
## 7 -0.044686 -0.157246  0.06787          1
## 8  0.008842 -0.112760  0.13045          1
## 9 -0.096886 -0.198963  0.00519          1
## 10 0.024848 -0.079724  0.12942          1

```

```
cat(count/10,"percent of CI's contained the mean")
```

```
## 97.6 percent of CI's contained the mean
```

Question 4

1.

```

makePatient <- function() {
  vowel <- grep("[aeiou]", letters)
  cons <- grep("[^aeiou]", letters)
  name <- paste(sample(LETTERS[cons], 1), sample(letters[vowel], 1), sample(letters[cons], 1), sep='')
  gender <- factor(sample(0:1, 1), levels=0:1, labels=c('female','male'))
  dob <- as.Date(sample(7500, 1), origin="1970-01-01")
  n <- sample(6, 1)
  doa <- as.Date(sample(1500, n), origin="2010-01-01")
  pulse <- round(rnorm(n, 80, 10))
  temp <- round(rnorm(n, 98.4, 0.3), 2)
  fluid <- round(runif(n), 2)
  list(name, gender, dob, doa, pulse, temp, fluid)
}

```

```

}

setClass("medicalRecord",slots=c("name", "gender", "date_of_birth", "date_of_admission", "pulse", "temp

medicalRecord <- function(object){
  names(object)<-c("name", "gender", "date_of_birth", "date_of_admission", "pulse", "temperature", "flu
  class(object)<-"medicalRecord"
  object
}

```

```

set.seed(8)
mrecord<-makePatient()
mrecord<-medicalRecord(mrecord)
mrecord

```

```

## $name
## [1] "Mev"
##
## $gender
## [1] male
## Levels: female male
##
## $date_of_birth
## [1] "1976-08-09"
##
## $date_of_admission
## [1] "2011-03-14" "2013-10-30" "2013-02-27" "2012-08-23" "2011-11-16"
##
## $pulse
## [1] 67 81 95 74 81
##
## $temperature
## [1] 98.33 98.16 99.00 98.49 98.67
##
## $fluid_intake
## [1] 0.62 0.93 0.18 0.39 0.34
##
## attr("class")
## [1] "medicalRecord"

```

```

attributes(mrecord)

```

```

## $names
## [1] "name"          "gender"          "date_of_birth"
## [4] "date_of_admission" "pulse"          "temperature"
## [7] "fluid_intake"
##
## $class
## [1] "medicalRecord"

```

2.

```

mean.medicalRecord <- function(object){
  list(pulse=mean(object$pulse),temperature = mean(object$temperature),fluids=mean(object$fluid_intake))
}

print.medicalRecord <- function(object){
  cat("name:",object$name,"\n")
  cat(paste("gender:",object$gender,"\n"))
  cat(paste("data of birth:",object$date_of_birth,"\n"))
  cat("date of admission\t","pulse\t","temperature\t","fluid intake\n ")
  cat(paste(object$date_of_admission[order(object$date_of_admission)],"\t\t\t",object$pulse[order(object
}

plot.medicalRecord <- function(object){
  plot(object$date_of_admission[order(object$date_of_admission)],object$pulse[order(object$date_of_admission)])
  plot(object$date_of_admission[order(object$date_of_admission)],object$temperature[order(object$date_of_admission)])
  plot(object$date_of_admission[order(object$date_of_admission)],object$fluid_intake[order(object$date_of_admission)])
}

```

```
mean(mrecord)
```

```

## $pulse
## [1] 79.6
##
## $temperature
## [1] 98.53
##
## $fluids
## [1] 0.492

```

```
print(mrecord)
```

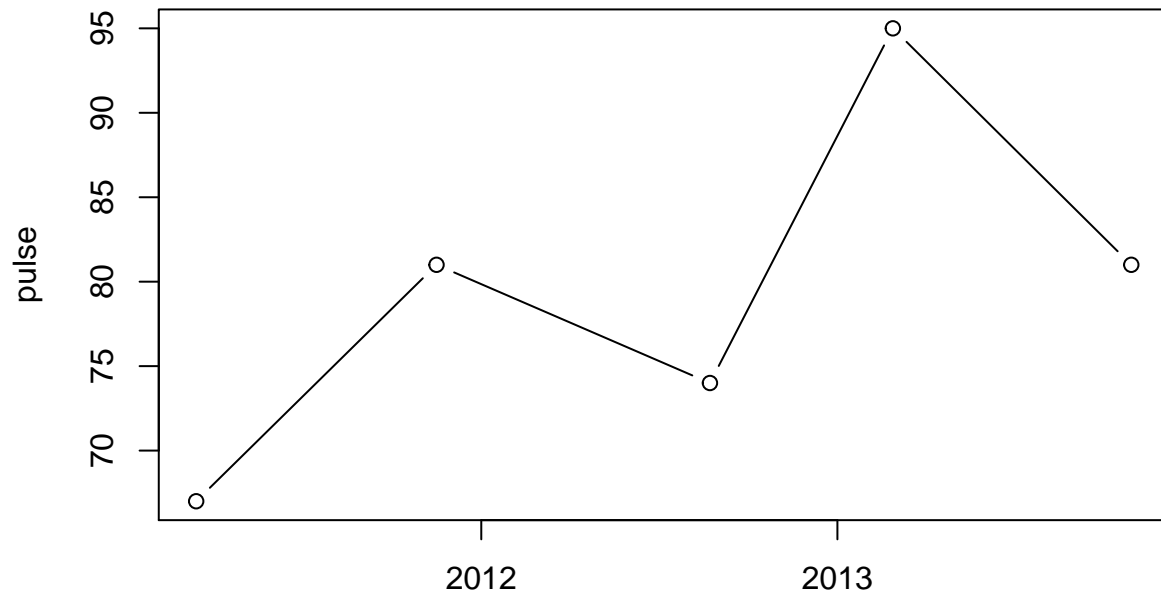
```

## name: Mev
## gender: male
## data of birth: 1976-08-09
## date of admission    pulse    temperature    fluid intake
## 2011-03-14           67      98.33           0.62
## 2011-11-16           81      98.67           0.34
## 2012-08-23           74      98.49           0.39
## 2013-02-27           95      99             0.18
## 2013-10-30           81      98.16           0.93

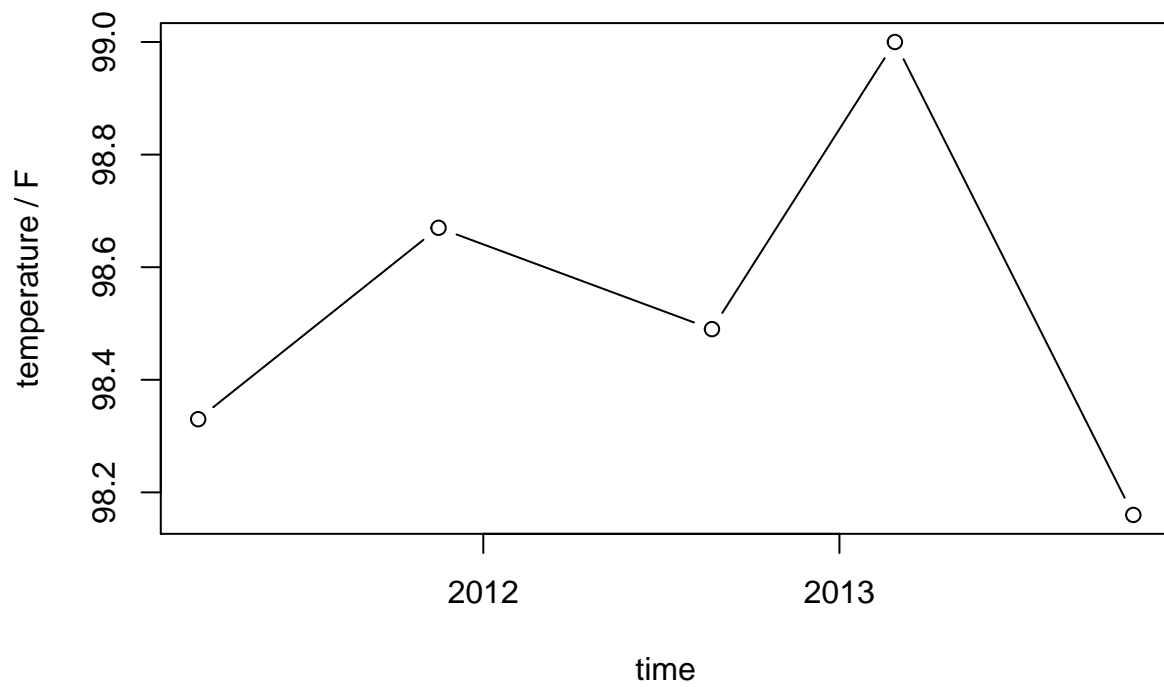
```

```
plot(mrecord)
```

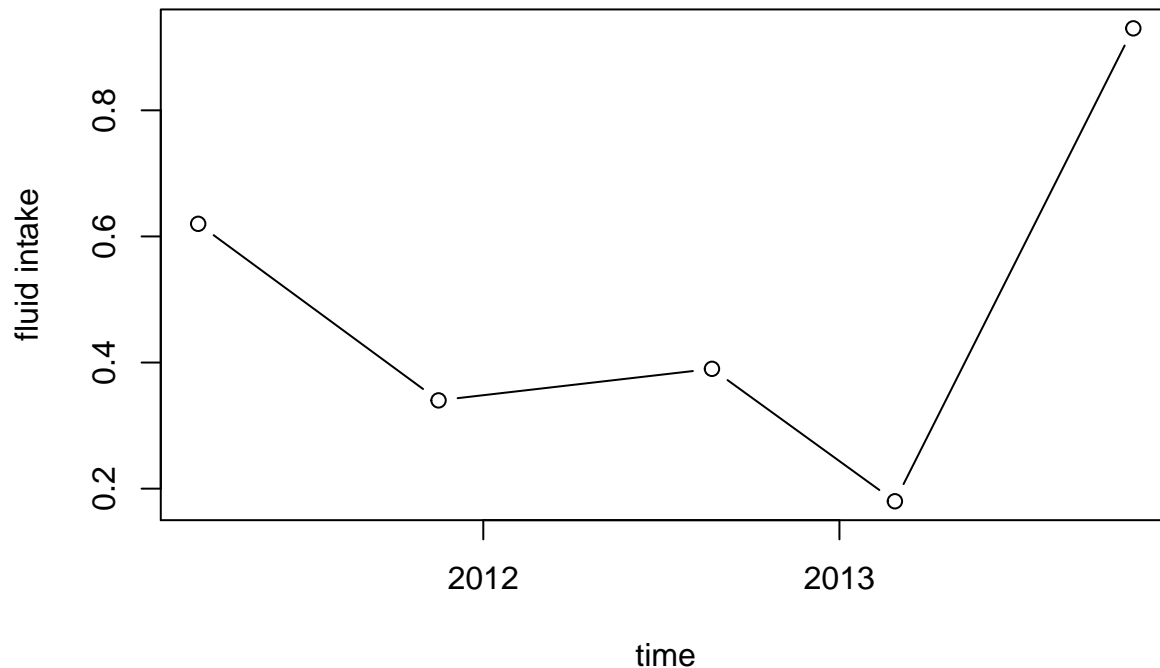
measurement of pulse over time



measurement of temperature over time



measurement of fluid intake over time



3.

```
setClass("cohort", slots=c("name", "medicalRecord"))
set.seed(8)
group<-list(name=NA, medicalRecord=NA)
for(i in 1:10){
  temp<-makePatient()
  temp<-medicalRecord(temp)
  group$name[i]<-temp[1]
  group$medicalRecord[i]<-list(temp)
}
class(group)<-"cohort"

mean.cohort <- function(object){
  medicalRecord<-list(name=NA, pulse=NA, tem=NA, fluid=NA)
  for(i in 1:10){
    medicalRecord$name[i]<-object$name[[i]]
    medicalRecord$pulse[i]<-mean(object$medicalRecord[[i]]$pulse)
    medicalRecord$tem[i]<-mean(object$medicalRecord[[i]]$temperature)
    medicalRecord$fluid[i]<-mean(object$medicalRecord[[i]]$fluid_intake)
  }
  list(mean=medicalRecord)
}

print.cohort <- function(object){
  for(i in 1:10){
    cat("\nNo.", i, "\n")
    print(object$medicalRecord[[i]])
  }
}
```

```
}
```

```
mean(group)
```

```
## $mean
## $mean$name
## [1] "Mev" "Yul" "Zet" "Qih" "Wut" "Juy" "God" "Fut" "Pet" "Yed"
##
## $mean$pulse
## [1] 79.60 78.00 81.50 78.00 88.33 83.50 83.00 77.50 77.00 79.33
##
## $mean$tem
## [1] 98.53 98.50 98.44 98.60 98.05 98.45 98.01 98.15 98.83 98.30
##
## $mean$fluid
## [1] 0.4920 0.2450 0.4033 0.6500 0.5867 0.4525 0.9700 0.3367 0.4450 0.6583
```

```
print(group)
```

```
##
## No. 1
## name: Mev
## gender: male
## data of birth: 1976-08-09
## date of admission    pulse    temperature    fluid intake
## 2011-03-14           67      98.33           0.62
## 2011-11-16           81      98.67           0.34
## 2012-08-23           74      98.49           0.39
## 2013-02-27           95      99            0.18
## 2013-10-30           81      98.16           0.93
##
## No. 2
## name: Yul
## gender: male
## data of birth: 1988-06-28
## date of admission    pulse    temperature    fluid intake
## 2012-01-16           76      98.92           0.14
## 2013-08-07           80      98.07           0.35
##
## No. 3
## name: Zet
## gender: female
## data of birth: 1970-06-13
## date of admission    pulse    temperature    fluid intake
## 2010-03-21           79      98.58           0.22
## 2010-04-01           73      98.32           0.61
## 2012-08-29           88      98.47           0.59
## 2013-06-01           84      98.22           0.25
## 2013-11-03           72      98.54           0.03
## 2014-02-05           93      98.51           0.72
##
## No. 4
```

```

## name: Qih
## gender: female
## data of birth: 1987-08-30
## date of admission      pulse      temperature      fluid intake
## 2011-06-22              78        98.6              0.65
##
## No. 5
## name: Wut
## gender: male
## data of birth: 1974-06-28
## date of admission      pulse      temperature      fluid intake
## 2010-04-12              76        98.05             0.65
## 2011-02-16              93        98.26             0.97
## 2012-04-12              96        97.84             0.14
##
## No. 6
## name: Juy
## gender: male
## data of birth: 1983-06-09
## date of admission      pulse      temperature      fluid intake
## 2010-03-10              81        99.11             0.66
## 2010-03-25              90        98.58             0.26
## 2010-04-18              75        98.58             0.6
## 2010-06-10              88        97.53             0.29
##
## No. 7
## name: God
## gender: female
## data of birth: 1990-02-12
## date of admission      pulse      temperature      fluid intake
## 2010-03-12              83        98.01             0.97
##
## No. 8
## name: Fut
## gender: male
## data of birth: 1970-01-11
## date of admission      pulse      temperature      fluid intake
## 2011-04-07              80        97.87             0.36
## 2011-04-14              83        97.91             0
## 2011-08-16              66        98.49             0.13
## 2013-03-15              74        98.38             0.31
## 2013-06-20              74        98.41             0.49
## 2013-11-12              88        97.83             0.73
##
## No. 9
## name: Pet
## gender: male
## data of birth: 1979-01-01
## date of admission      pulse      temperature      fluid intake
## 2010-10-30              85        98.84             0.6
## 2012-05-10              69        98.82             0.29
##
## No. 10
## name: Yed

```

```
## gender: male
## data of birth: 1977-11-11
## date of admission    pulse    temperature    fluid intake
## 2010-01-28           63      97.95           0.94
## 2010-03-06           81      98.45           0.67
## 2010-07-10           98      98.65           0.79
## 2010-08-27           66      97.68           0.36
## 2011-06-18           83      98              0.69
## 2013-01-06           85      99.07           0.5
```