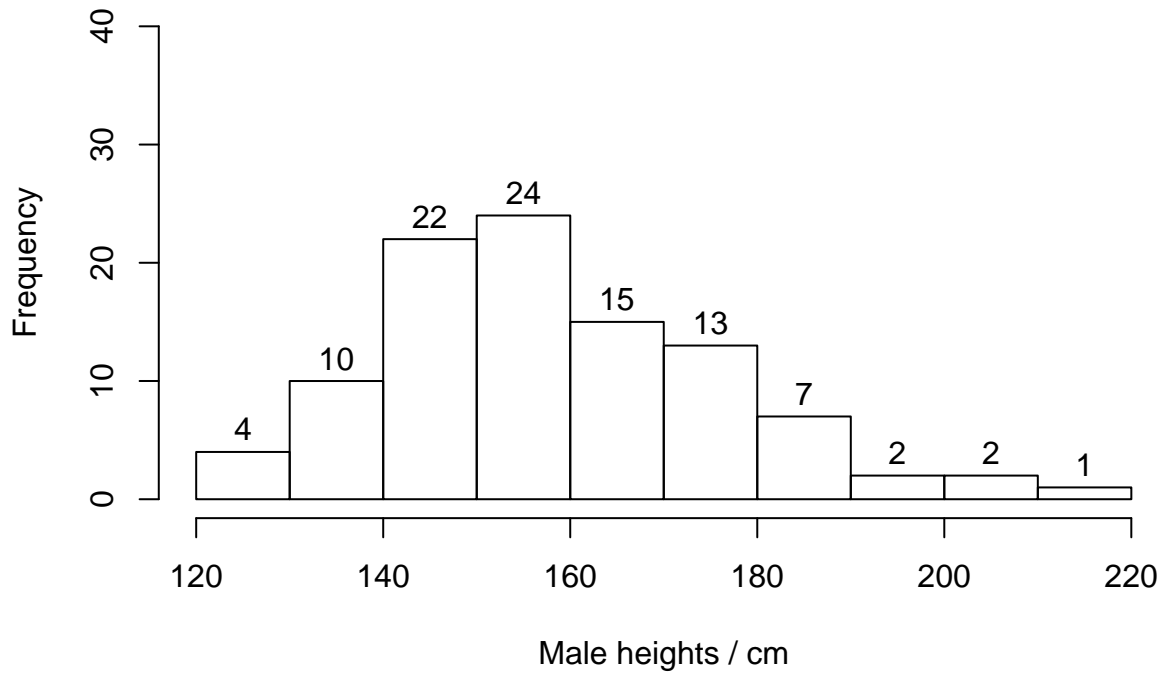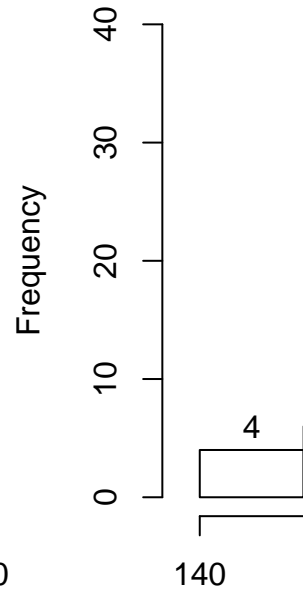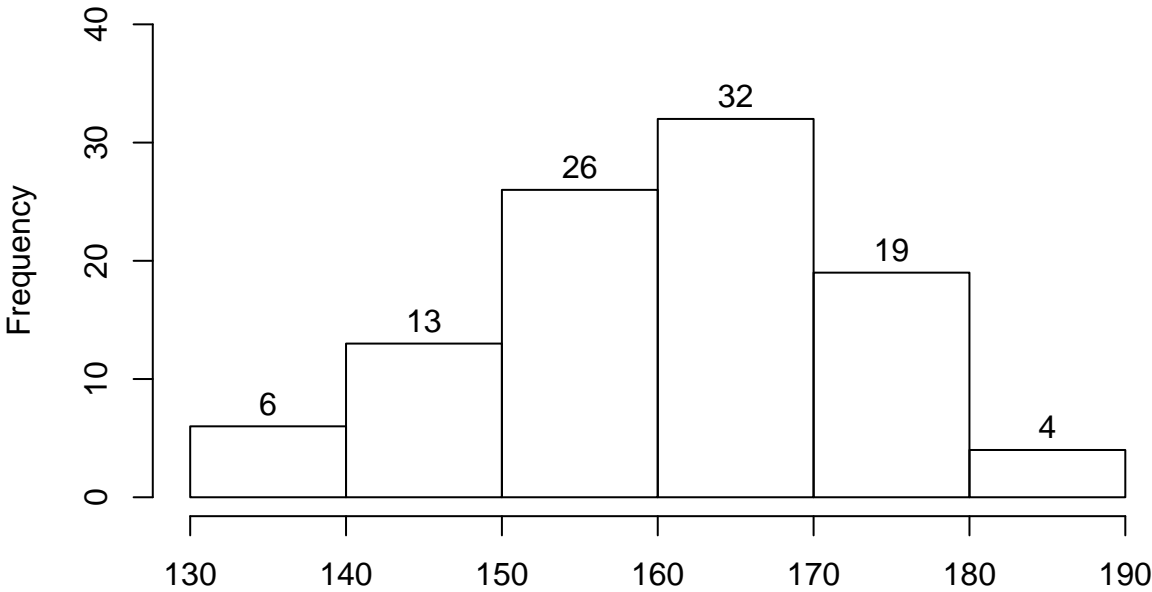# Bios 301: Assignment 4

Question 1

```r
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",labe
```
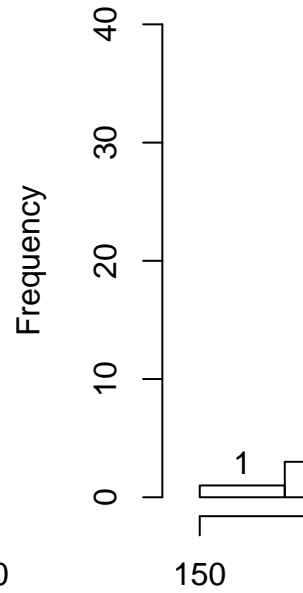
Histogram of generation 1


```r
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",labe
}
```

Histogram of generation 2

Male heights / cm

Histogram of generation 4

Male heights / cm

2

Histogram of generation 6

Male heights / cm
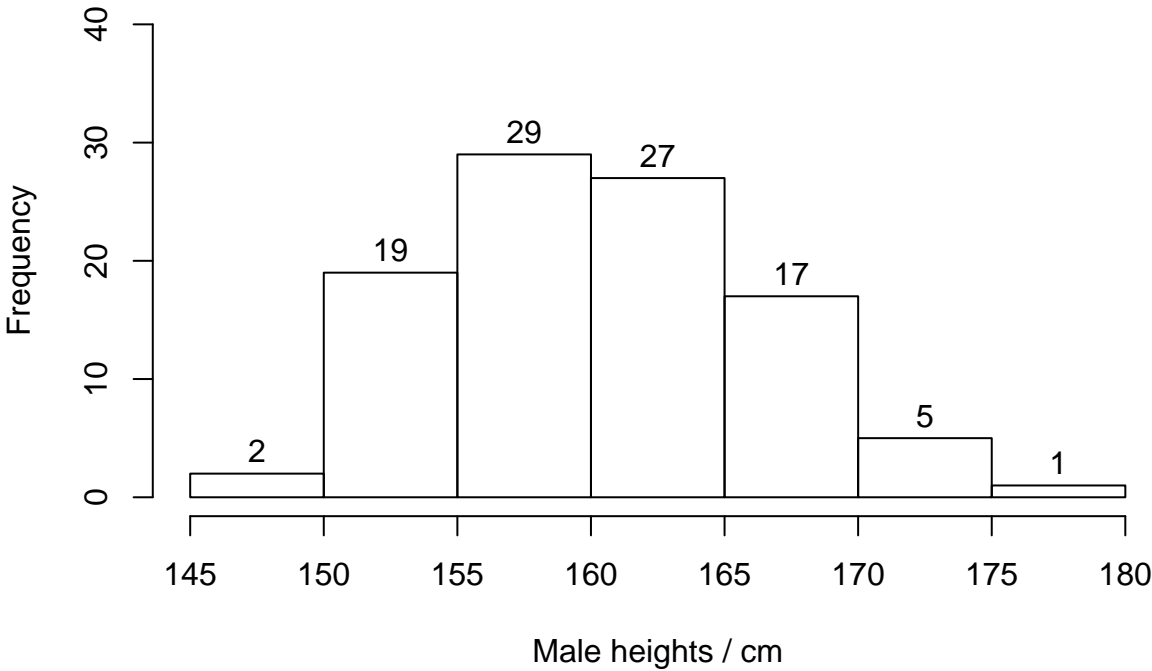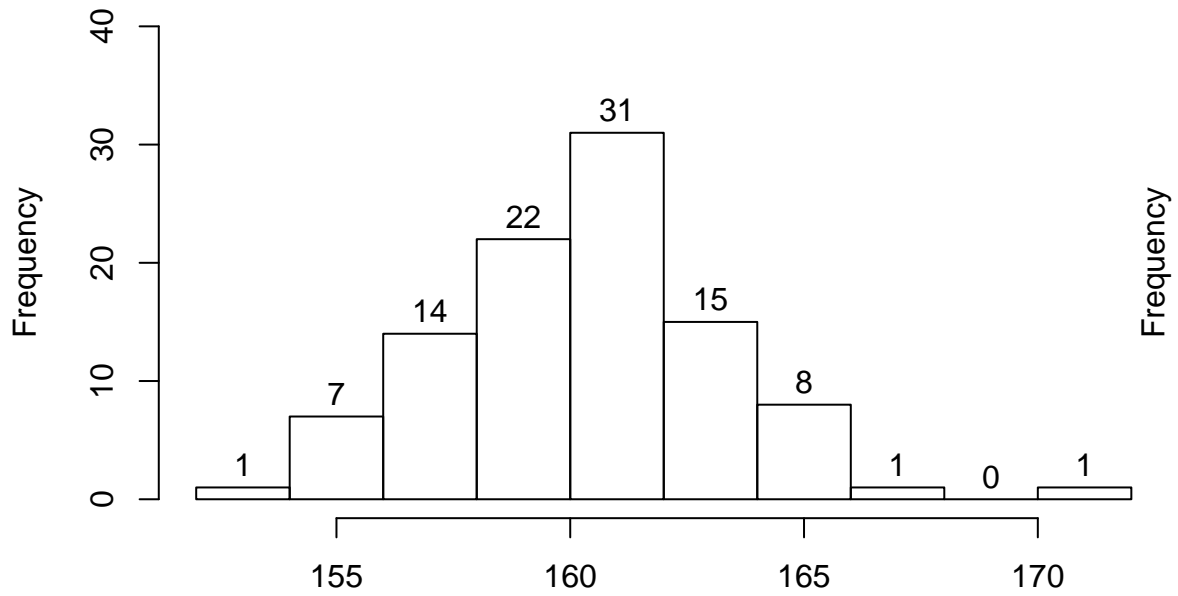
Histogram of generation 8

Male heights / cm
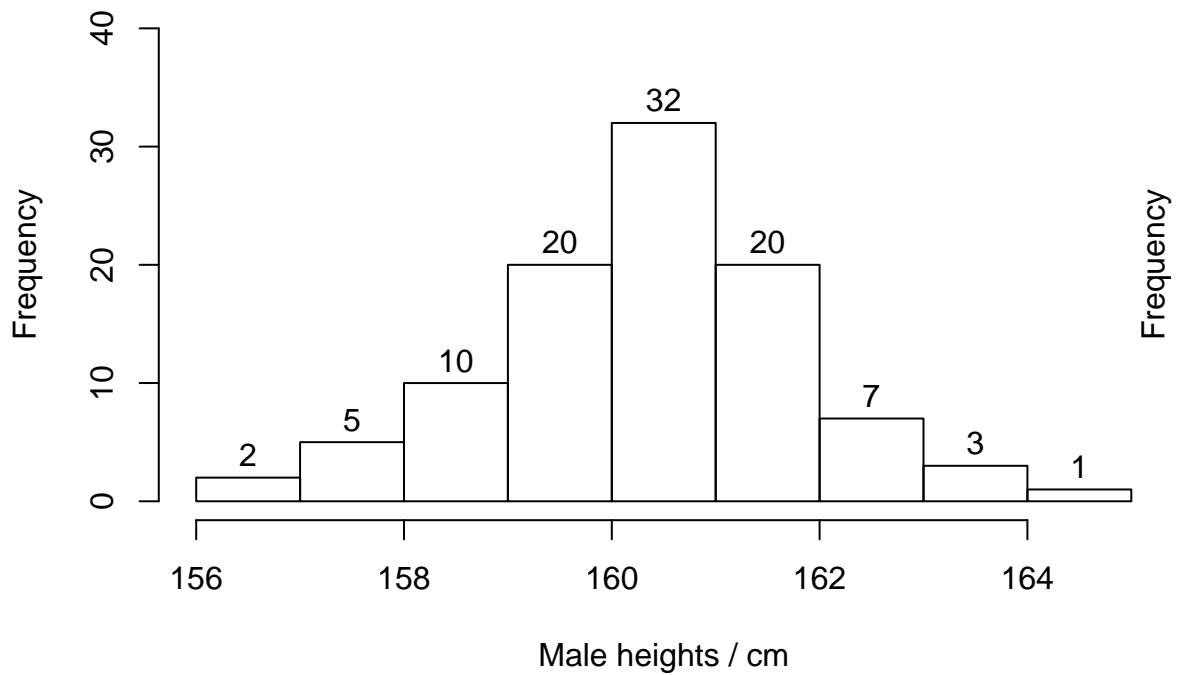
Question 2

```
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$m <- rowMeans(pop)
  pop$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 9 rows containing missing values (geom_point).
## Warning: Removed 2 rows containing missing values (geom_point).
```
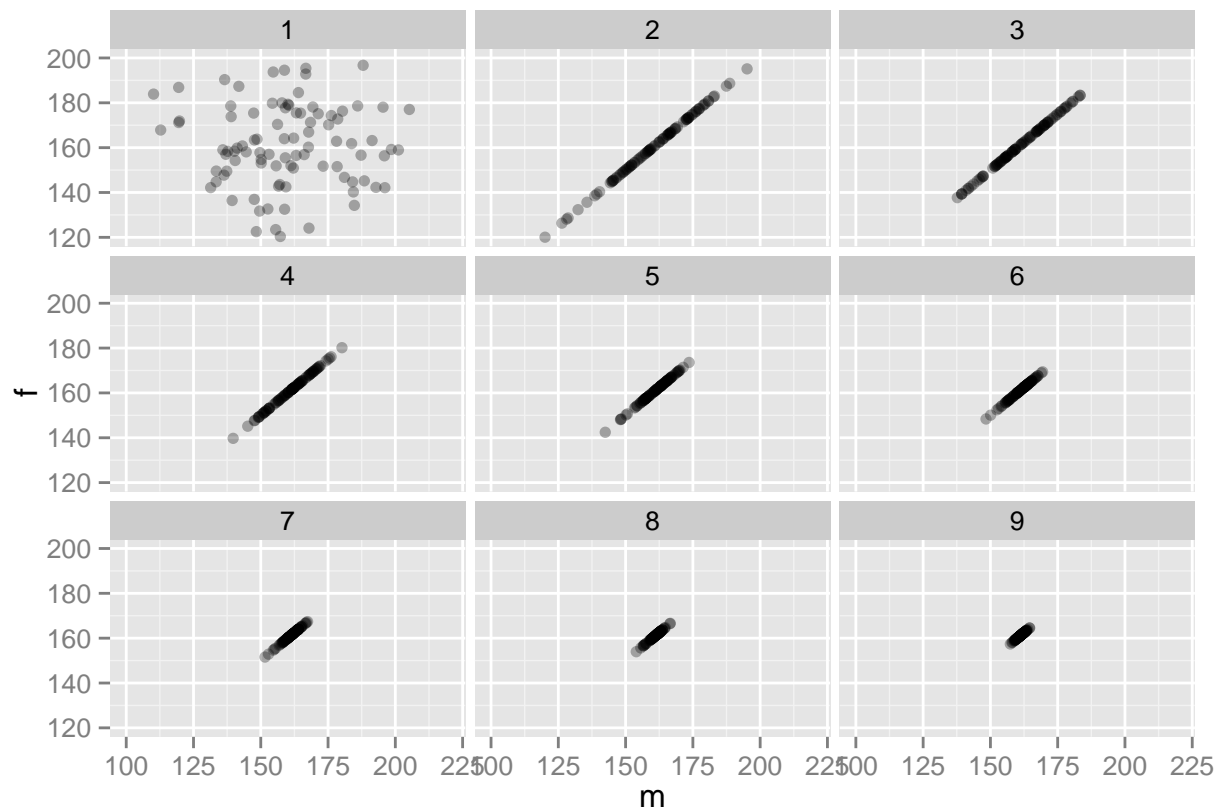

Question 3

```
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.

```r
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_admis
  plot(object$date_of_admission[order(object$date_of_admission)],object$temperature[order(object$date_o
  plot(object$date_of_admission[order(object$date_of_admission)],object$fluid_intake[order(object$date_
}
```

```r
mean(mrecord)
```

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

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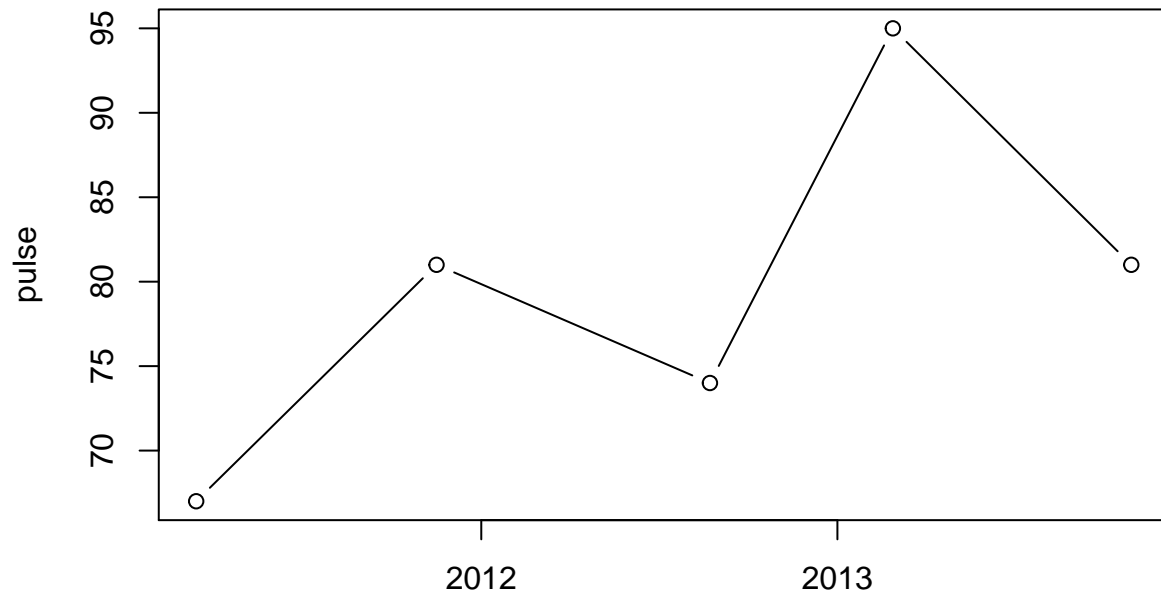
```
## name: Mev
## gender: male
## data of birth: 1976-08-09
## date of admission     pulse    temperature      fluid intake
##   2011-03-14          67       98.33           0.62
##   2011-11-16          81       98.67           0.34
##   2012-08-23          74       98.49           0.39
##   2013-02-27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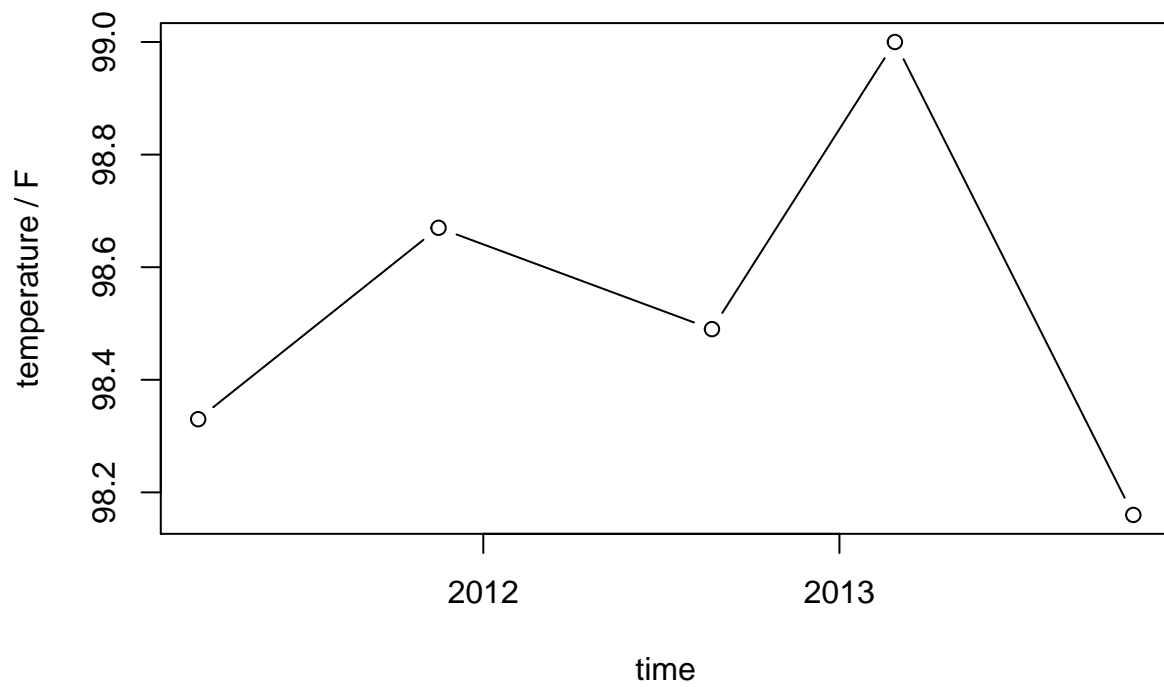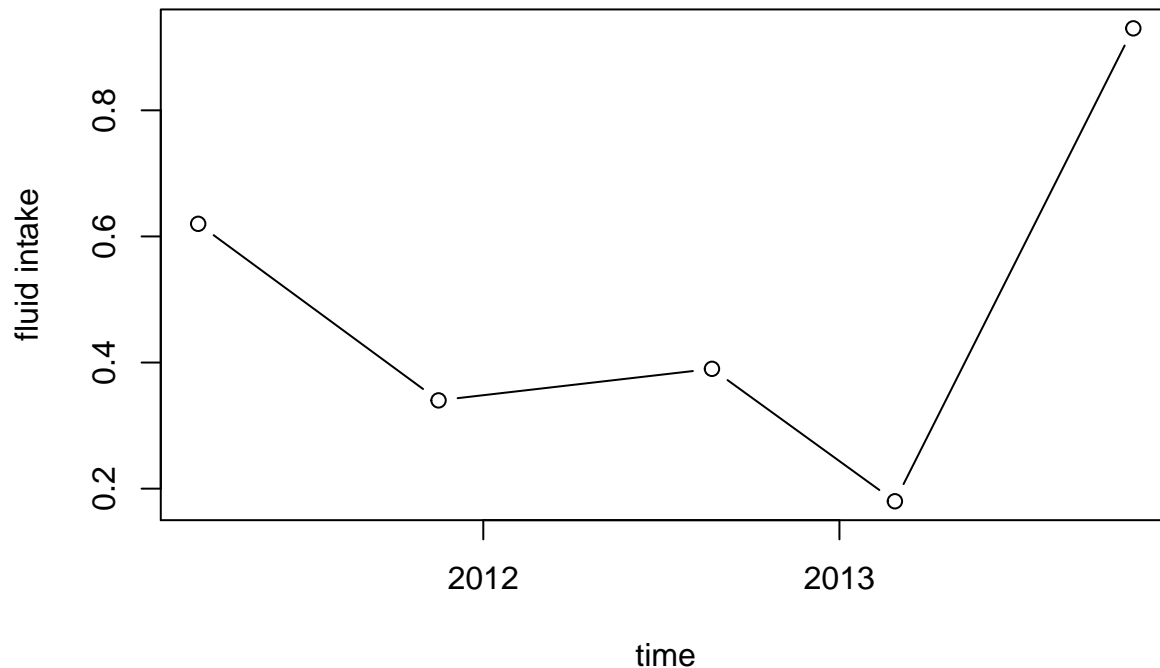
```r
plot(mrecord)
```

measurement of pulse over time

measurement of temperature over time

measurement of fluid intake over time

3.

```r
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]])
  }
}
```

```
}
```

```r
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
```

```r
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
```

5.

```
#ggplot(pop, aes(x=m, y=f))+coord_polar(theta="y")
```