# Homework 06

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```r
library("ggplot2")
```

Question 01

```r
pop <- data.frame(m = rnorm(100, 160, 20), f = rnorm(100, 160, 20)) #pop1
next_gen <- function(pop) {
  pop$m <- sample(pop$m)
  pop$m <- rowMeans(pop)
  pop$f <- pop$m
  pop
}
pop2 <- next_gen(pop)
pop3 <- next_gen(pop2)
pop4 <- next_gen(pop3)
pop5 <- next_gen(pop4)
pop6 <- next_gen(pop5)
pop7 <- next_gen(pop6)
pop8 <- next_gen(pop7)
pop9 <- next_gen(pop8)
hist(pop$m, xlab=" male height", main='Male height distribution first generation')
```
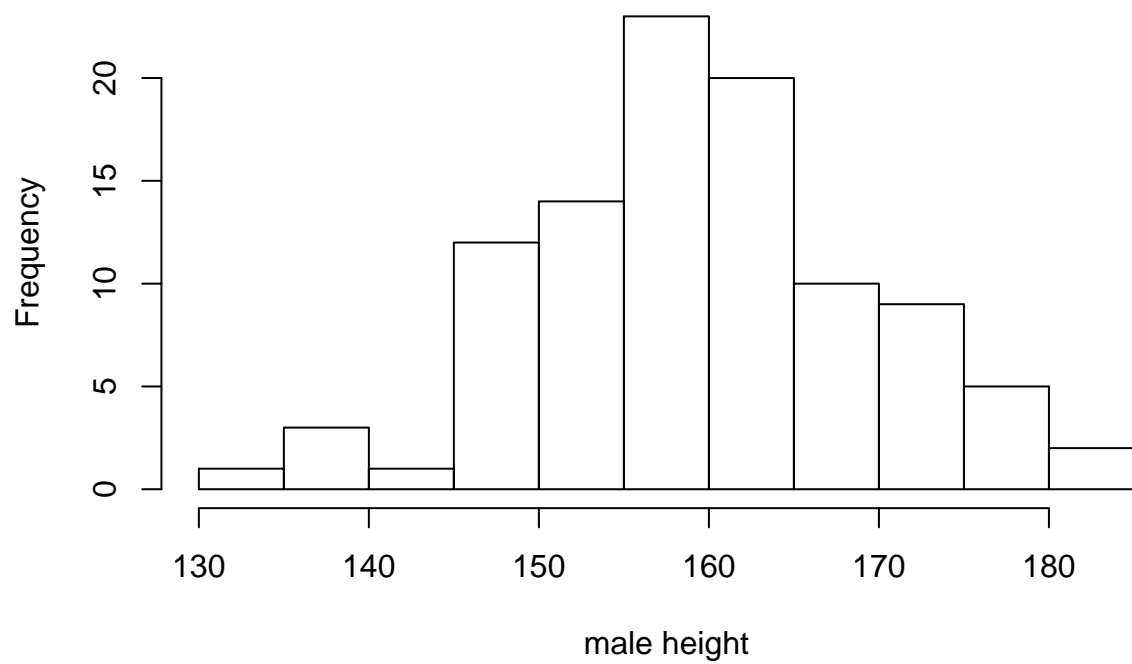
Male height distribution first generation
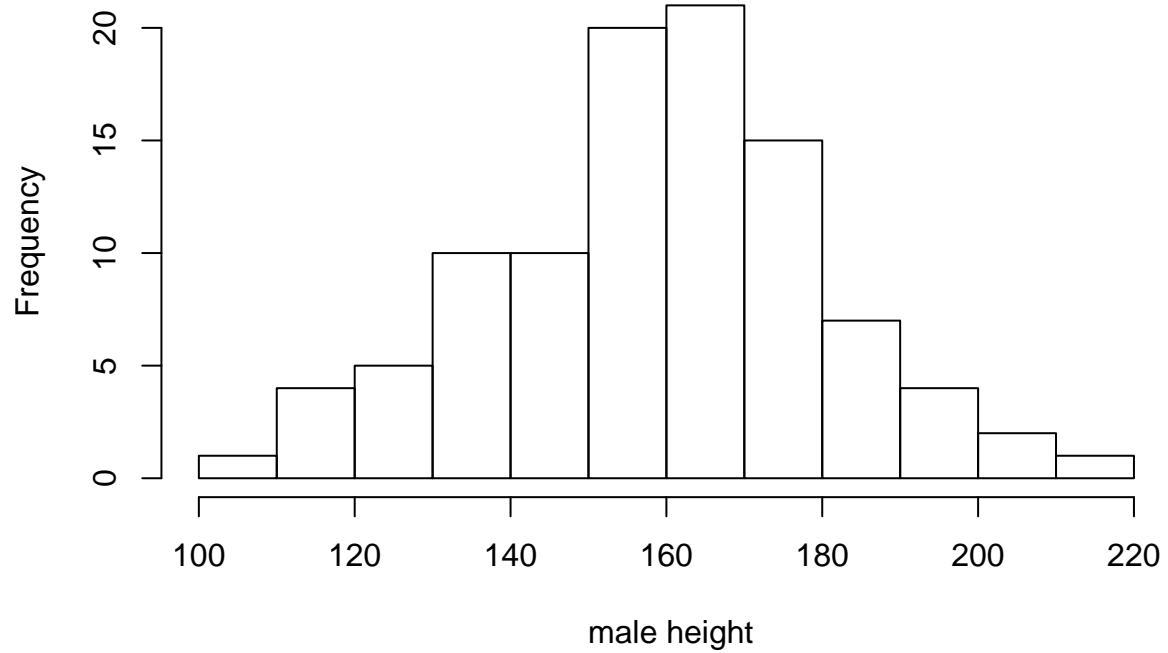

```r
hist(pop2$m, xlab="male height", main='Male height distribution second generation')
```

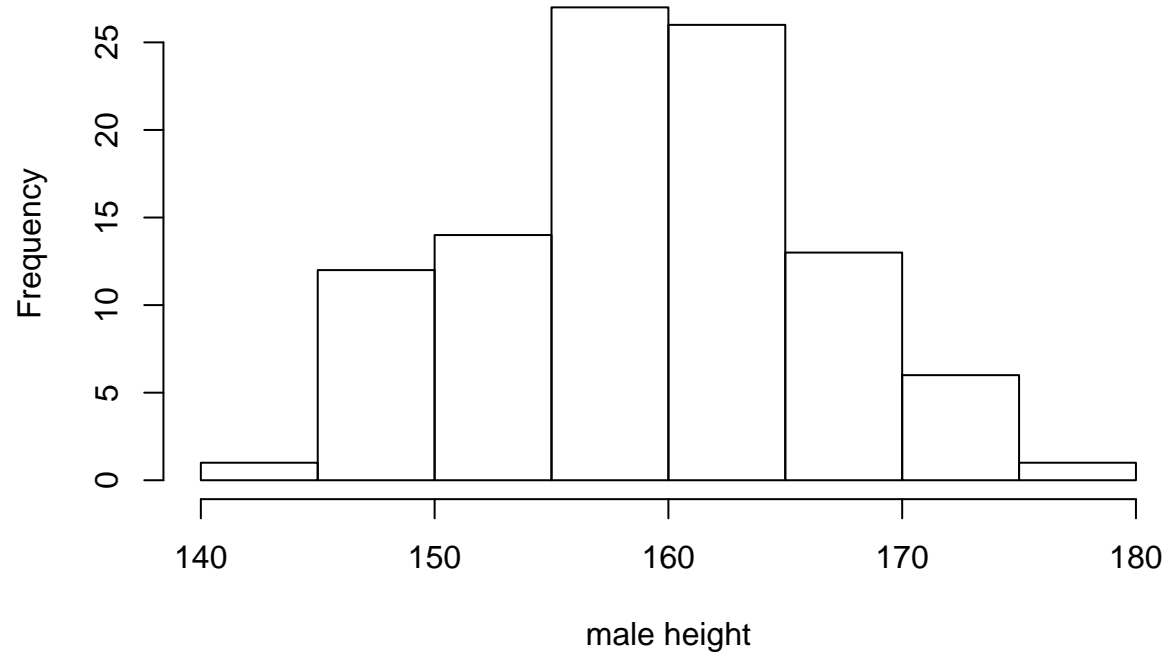## Male height distribution second generation
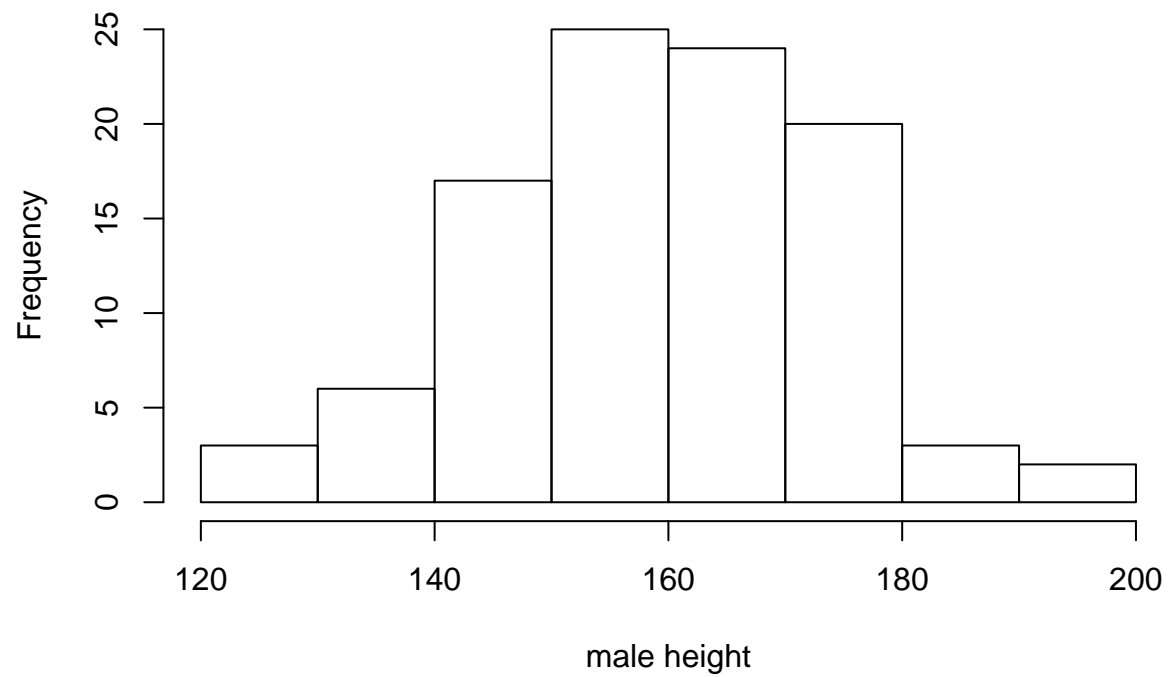

```
hist(pop3$m, xlab="male height", main='Male height distribution third generation')
```

Male height distribution third generation
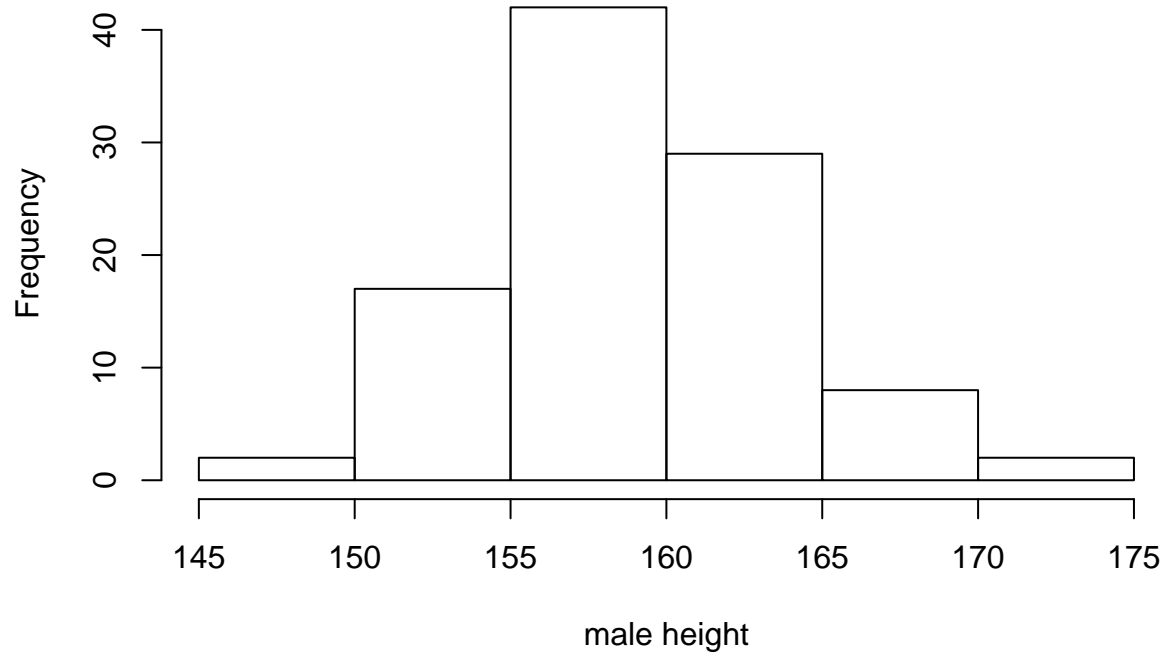


```r
hist(pop4$m, xlab="male height", main='Male height distribution fourth generation')
```

Male height distribution fourth generation


```r
hist(pop5$m, xlab="male height", main='Male height distribution fifth generation')
```

Male height distribution fifth generation


```
hist(pop6$m, xlab="male height", main='Male height distribution sixth generation')
```

Male height distribution sixth generation


```r
hist(pop7$m, xlab="male height", main='Male height distribution seventh generation')
```

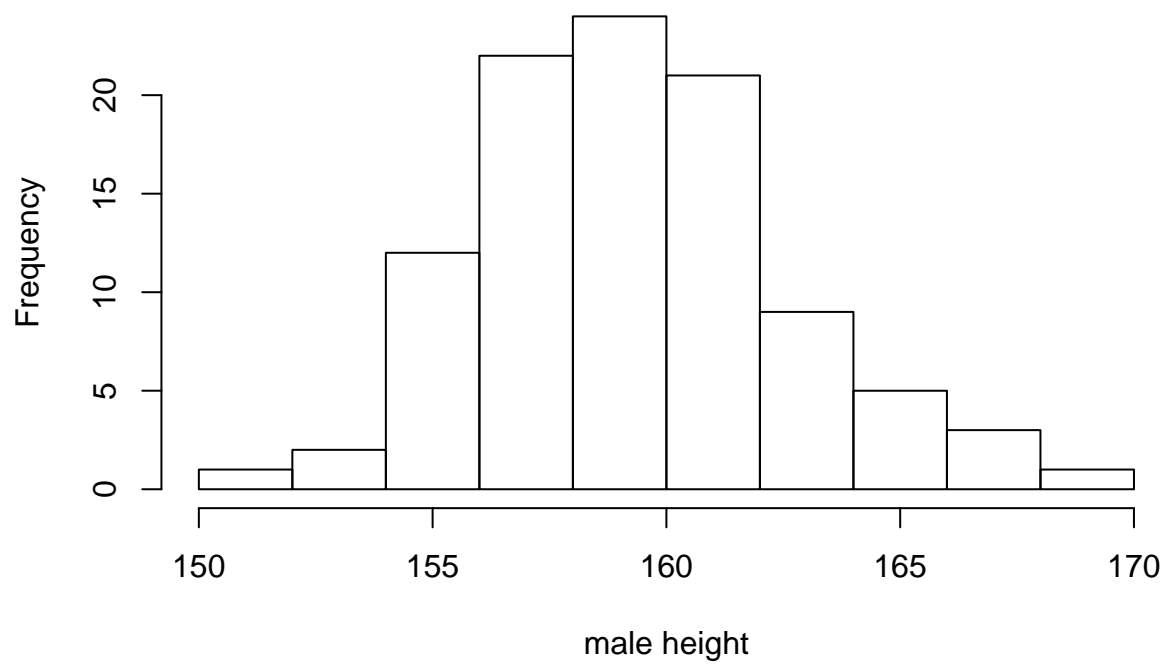## Male height distribution seventh generation


```r
hist(pop8$m, xlab="male height", main='Male height distribution eigth generation')
```
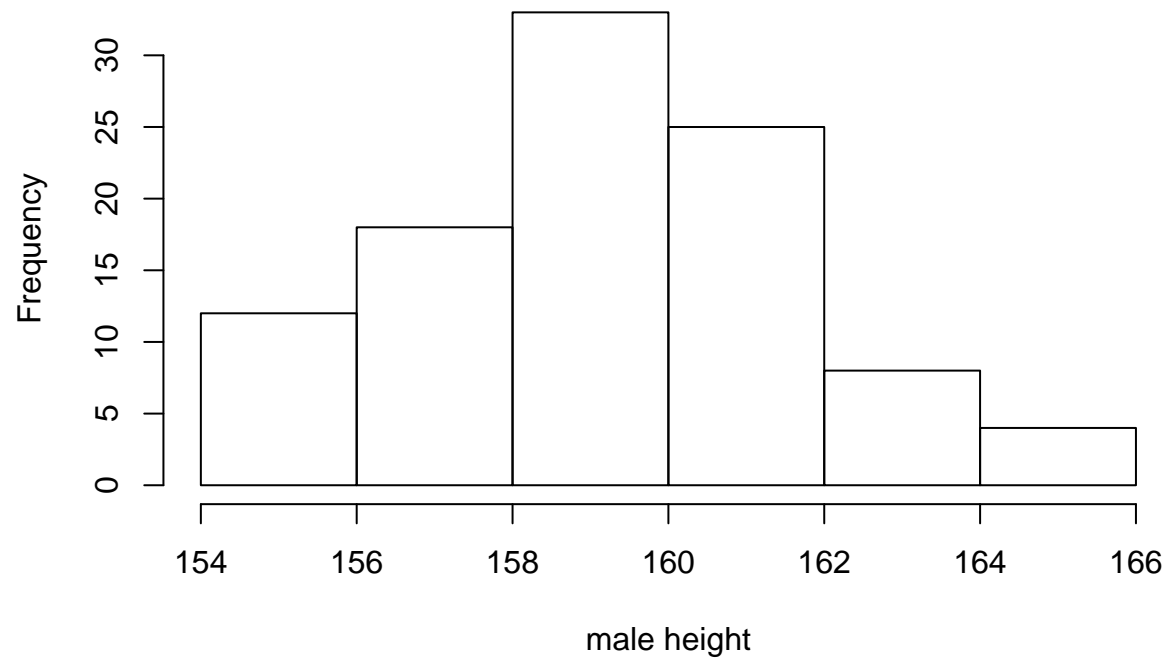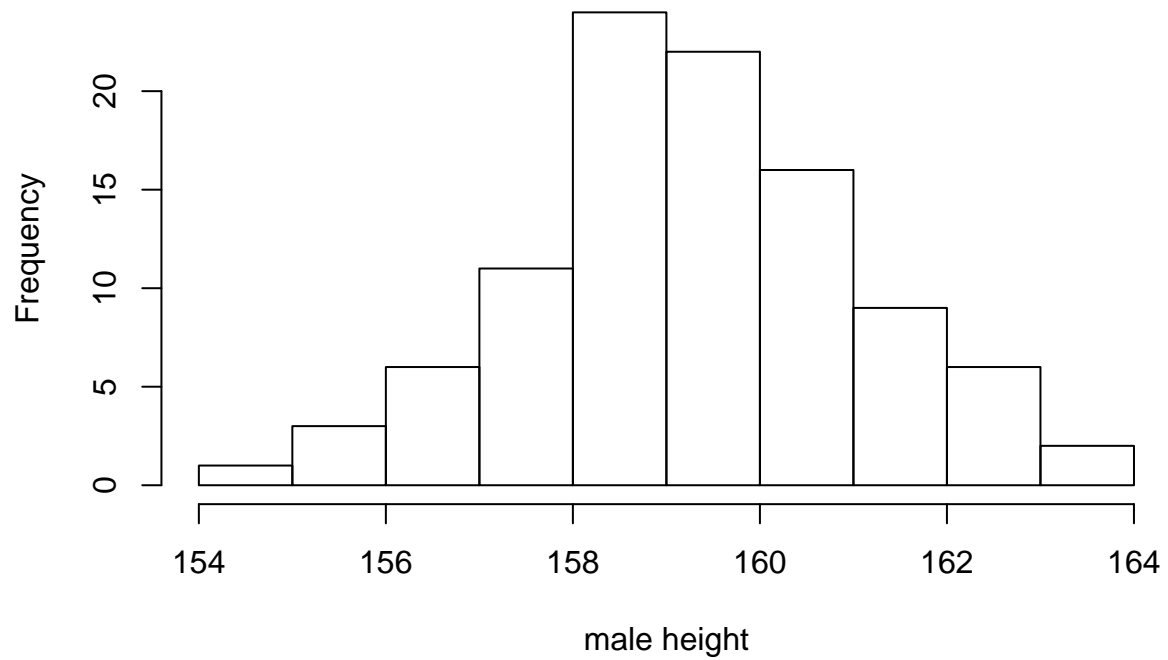
Male height distribution eigth generation


```
hist(pop9$m, xlab="male height", main='Male height distribution ninth generation')
```

Male height distribution ninth generation
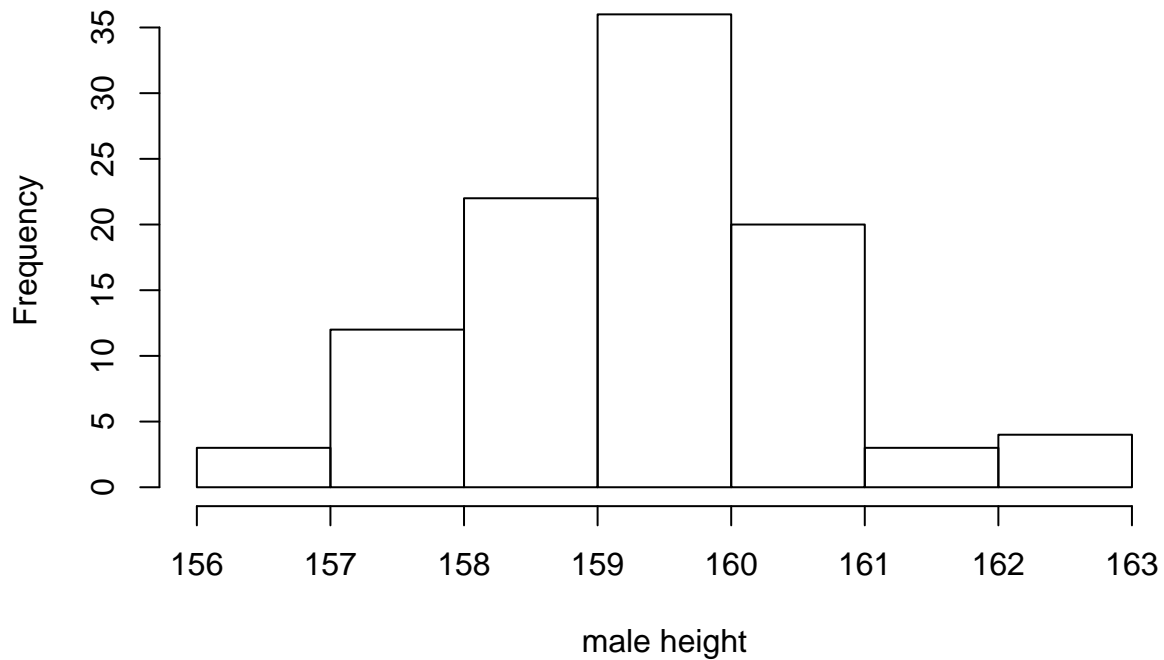
Question 02

```
pop$generation <- 1
pop2$generation <- 2
pop3$generation <- 3
pop4$generation <- 4
pop5$generation <- 5
pop6$generation <- 6
pop7$generation <- 7
pop8$generation <- 8
pop9$generation <- 9
newpop <- rbind(pop,pop2,pop3,pop4,pop5,pop6,pop7,pop8,pop9)

ggplot(newpop, aes(m,f)) + geom_point(alpha=0.15, shape = 16, size =2) + facet_wrap(~generation)+
  scale_y_continuous(breaks=seq(120,200,20)) + scale_x_continuous(breaks=seq(100,220,20)) +
  theme(text = element_text(size=15))
```
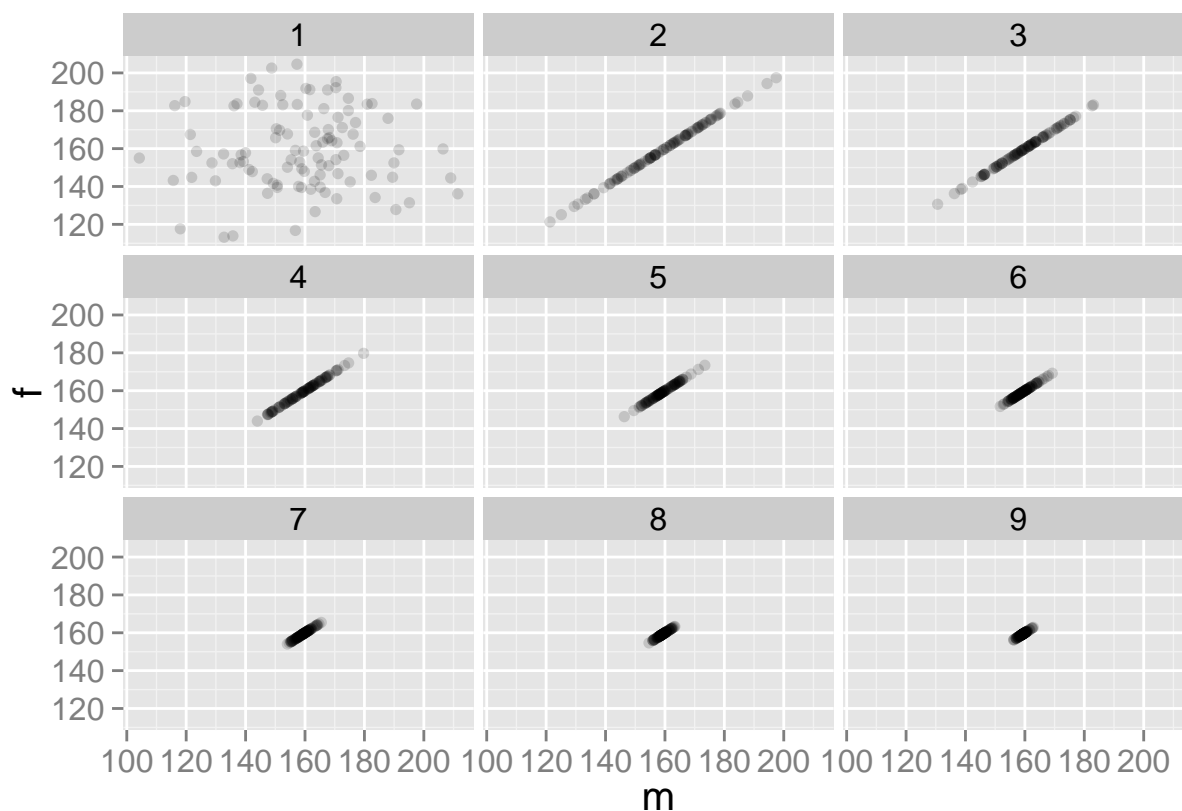
Question 03

```
medianone <- rep(NA,10)
medianzero <- rep(NA, 10)
upquanone <- rep(NA,10)
loquanone <- rep(NA, 10)
upquanzero <- rep(NA, 10)
loquanzero <- rep(NA,10)
for(i in c(250, 500, 750, 1000, 1250, 1500, 1750, 2000, 2250, 2500)){
  treatment <- rbinom(i,1,1/2)
  data <- rnorm(i,60,20)
  oned <- which(treatment == 1)
  zerd <- which (treatment == 0)
  data[oned] <- data[oned] + 5
  bmone <- replicate(1000, mean(sample(data[oned],length(data[oned]), replace = TRUE)))
  bmzero <-  replicate(1000, mean(sample(data[zerd],length(data[zerd]), replace = TRUE)))
  medianone[i/250] <- quantile(bmone, prob=0.5)
  medianzero[i/250]<- quantile(bmzero, prob=0.5)
  upquanone[i/250] <- quantile(bmone, prob=0.975)
  loquanone[i/250] <- quantile(bmone, prob=0.025)
  upquanzero[i/250] <- quantile(bmzero, prob=0.975)
  loquanzero[i/250] <- quantile(bmzero, prob=0.025)
}
makeTransparent = function(..., alpha=0.5) {
```

```
  if(alpha<0 | alpha>1) stop("alpha must be between 0 and 1")
  alpha = floor(255*alpha)
  newColor = col2rgb(col=unlist(list(...)), alpha=FALSE)
  .makeTransparent = function(col, alpha) {
    rgb(red=col[1], green=col[2], blue=col[3], alpha=alpha, maxColorValue=255)
  }
  newColor = apply(newColor, 2, .makeTransparent, alpha=alpha)
  return(newColor)
}
plot(1:10, medianone, type='l', xlab=" ", ylab=" ", ylim=c(50,75))
lines(1:10, medianzero)
polygon(x=c(seq(1,10), seq(10,1)),
        y=c(upquanone,rev(loquanone)), border=NA, col=makeTransparent('red',alpha=0.5))
polygon(x=c(seq(1,10), seq(10,1)),
        y=c(upquanzero,rev(loquanzero)), border=NA, col=makeTransparent('blue',alpha=0.5))
```
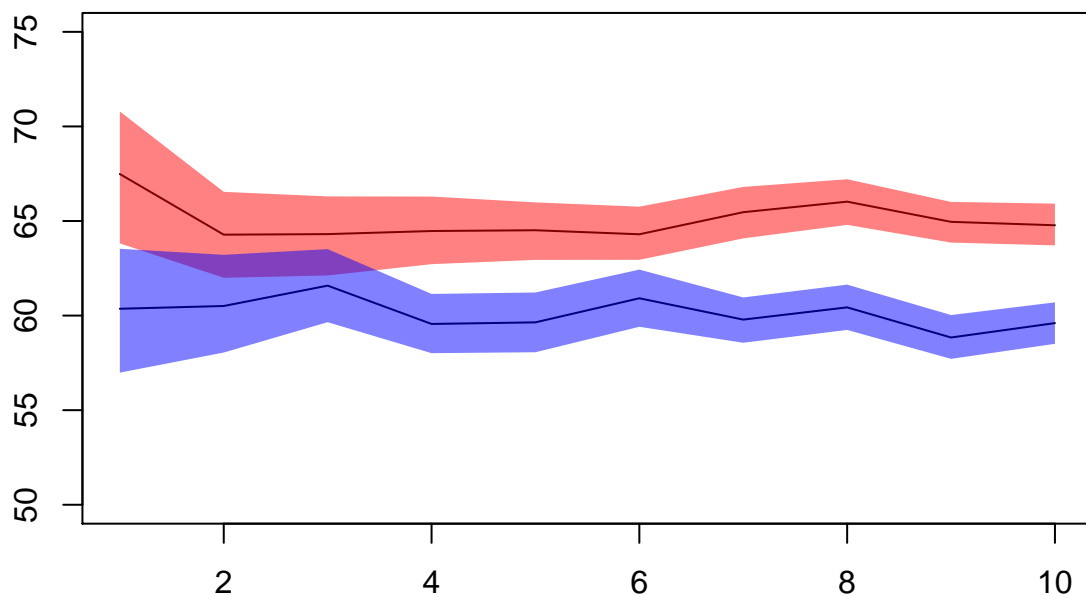

Question 04

1. Print the medical record, and print the class of the medical record

```
set.seed(8)
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)
}
patient <- function(x) {
  output <- makePatient()

  value <- list(output[1],output[2],output[3],output[4],output[5],
                output[6],output[7])
  names(value) <- c("name", "gender", "date_of_birth","date_of_admission",
                    "pulse","temperature","fluid")

  attr(value, "class") <- "medicalRecord"
  value
}
medicalrecord <- patient()
medicalrecord
```

```
## $name
## $name[[1]]
## [1] "Mev"
##
##
## $gender
## $gender[[1]]
## [1] male
## Levels: female male
##
##
## $date_of_birth
## $date_of_birth[[1]]
## [1] "1976-08-09"
##
##
## $date_of_admission
## $date_of_admission[[1]]
## [1] "2011-03-14" "2013-10-30" "2013-02-27" "2012-08-23" "2011-11-16"
##
##
## $pulse
## $pulse[[1]]
## [1] 67 81 95 74 81
##
##
## $temperature
## $temperature[[1]]
## [1] 98.33 98.16 99.00 98.49 98.67
```

```
##
##
## $fluid
## $fluid[[1]]
## [1] 0.62 0.93 0.18 0.39 0.34
##
##
## attr(,"class")
## [1] "medicalRecord"
```

```r
class(medicalrecord)
```

```
## [1] "medicalRecord"
```

2.Call each function for the medical record created in part 1

```r
#mean
mean.medicalRecord <- function(obj){
  cat("average pulse:", mean(unlist(obj$pulse)), "\n" )
  cat("average temperature:",mean(unlist(obj$temp)), "\n" )
  cat("average fluid:",mean(unlist(obj$fluid)), "\n" )
}
mean(medicalrecord)
```

```
## average pulse: 79.6
## average temperature: 98.53
## average fluid: 0.492
```

```r
#plot
plot.medicalRecord <- function(obj){
  par(mfrow=c(1,3))
  plot(unlist(obj$pulse), type='l', col="blue", main="Pulse measurement",
       ylab="pulse", xlab='each admission')
  plot(unlist(obj$temp), type='l', col="red", main="Temperature measurement",
       ylab="temperature(F)", xlab='each admission')
  plot(unlist(obj$fluid), type='l', col="green", main="Fluid measurement",
       ylab="fluid", xlab='each admission')

}
plot(medicalrecord)
```

Pulse measurement   **Temperature measurement**   **Fluid measurement**
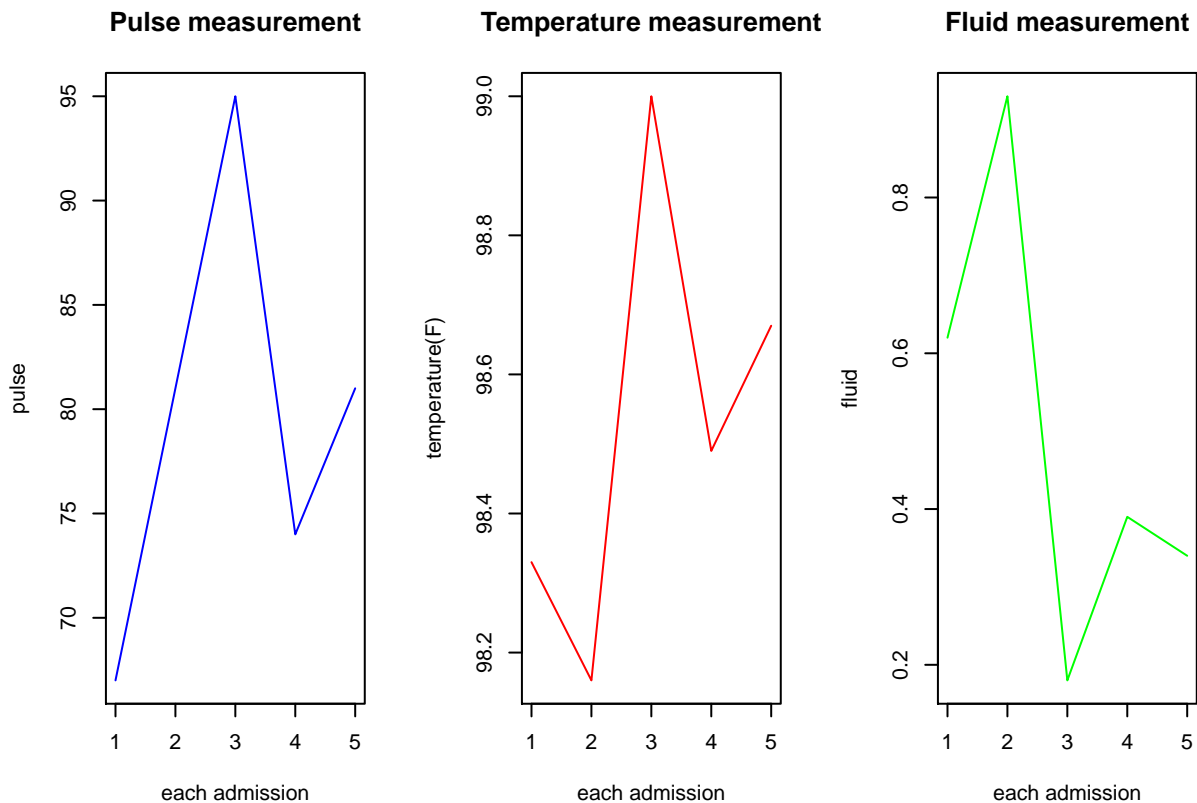
```r
#print
print.medicalRecord <- function(obj) {
  doa <- do.call(unlist, obj$date_of_admission)
  pulse <- do.call(unlist, obj$pulse)
  temp <-do.call(unlist, obj$temperature)
  fluid <- do.call(unlist, obj$fluid)
  matm <- matrix(NA, ncol=length(doa), nrow=3)
  colnames(matm) <- as.character(doa)
  rownames(matm) <- c("pulse", "temperature", "fluid")
  for(i in 1:length(doa)){
    matm[1,i] <- pulse[i]
    matm[2,i] <- temp[i]
    matm[3,i] <- fluid[i]
  }
  a <- list(matm)
  names(a) <- obj$name
  return(a)
}
print(medicalrecord)
```

```
## $Mev
##            2011-03-14 2013-10-30 2013-02-27 2012-08-23 2011-11-16
## pulse           67.00      81.00      95.00      74.00      81.00
## temperature     98.33      98.16      99.00      98.49      98.67
## fluid            0.62       0.93       0.18       0.39       0.34
```

3.Reset the RNG seed to 8 and create a cohort of ten patients, then show the output

```r
set.seed(8)
makecohortPatient <- function() {
  cohort <- c()
  for(i in 1:10){
    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)
    indi <- list(name=name, gender=as.character(gender), dob=as.character(dob), doa=as.character(doa), 
    cohort <- c(cohort, indi)
  }
  return(cohort)
}
group <- makecohortPatient()
class(group) <- "cohort"
#take mean of all patients
mean.cohort <- function(obj){
  pulsetotal <- rep(NA, 10)
  temptotal <- rep(NA, 10)
  fluidtotal <- rep(NA, 10)
  for(i in 1:10){
    pulsetotal[i] <- mean(unlist(obj[(7*i)-2]))
    temptotal[i] <-  mean(unlist(obj[(7*i)-1]))
    fluidtotal[i] <- mean(unlist(obj[7*i]))
  }
  cat("average pulse:", pulsetotal, "\n" )
  cat("average temperature:",temptotal, "\n" )
  cat("average fluid:",fluidtotal, "\n" )
}
mean(group)
```

```
## average pulse: 79.6 78 81.5 78 88.33333 83.5 83 77.5 77 79.33333
## average temperature: 98.53 98.495 98.44 98.6 98.05 98.45 98.01 98.14833 98.83 98.3
## average fluid: 0.492 0.245 0.4033333 0.65 0.5866667 0.4525 0.97 0.3366667 0.445 0.6583333
```

```r
#print all patients' measurements according to dates
print.cohort <- function(obj){
  thislist <- list(0,0,0,0,0,0,0,0,0,0,0)
  for(i in 1:10){
    doaa <- unlist(obj[(7*i) - 3])
    mat <- matrix(NA, ncol=length(doaa), nrow=3)
    pulse <- unlist(obj[(7*i)-2])
    temp <-unlist(obj[(7*i)-1])
    fluid <- unlist(obj[7*i])
    colnames(mat) <- as.character(doaa)
```

```
    rownames(mat) <- c("pulse", "temperature", "fluid")
    for(k in 1:length(doaa)){
      mat[1,k] <- pulse[k]
      mat[2,k] <- temp[k]
      mat[3,k] <- fluid[k]
    }
    thislist[[i]] <- mat

  }
  return(thislist)
}
print(group)
```

```
## [[1]]
##              2011-03-14 2013-10-30 2013-02-27 2012-08-23 2011-11-16
## pulse             67.00      81.00      95.00      74.00      81.00
## temperature       98.33      98.16      99.00      98.49      98.67
## fluid              0.62       0.93       0.18       0.39       0.34
##
## [[2]]
##              2012-01-16 2013-08-07
## pulse             76.00      80.00
## temperature       98.92      98.07
## fluid              0.14       0.35
##
## [[3]]
##              2013-11-03 2014-02-05 2013-06-01 2012-08-29 2010-04-01
## pulse             72.00      93.00      84.00      88.00      73.00
## temperature       98.54      98.51      98.22      98.47      98.32
## fluid              0.03       0.72       0.25       0.59       0.61
##              2010-03-21
## pulse             79.00
## temperature       98.58
## fluid              0.22
##
## [[4]]
##              2011-06-22
## pulse             78.00
## temperature       98.60
## fluid              0.65
##
## [[5]]
##              2011-02-16 2012-04-12 2010-04-12
## pulse             93.00      96.00      76.00
## temperature       98.26      97.84      98.05
## fluid              0.97       0.14       0.65
##
## [[6]]
##              2010-03-25 2010-06-10 2010-04-18 2010-03-10
## pulse             90.00      88.00      75.00      81.00
## temperature       98.58      97.53      98.58      99.11
## fluid              0.26       0.29       0.60       0.66
##
```

```
## [[7]]
##              2010-03-12
## pulse           83.00
## temperature     98.01
## fluid            0.97
##
## [[8]]
##              2013-03-15 2011-08-16 2013-11-12 2011-04-14 2011-04-07
## pulse           74.00      66.00      88.00      83.00      80.00
## temperature     98.38      98.49      97.83      97.91      97.87
## fluid            0.31       0.13       0.73       0.00       0.36
##              2013-06-20
## pulse           74.00
## temperature     98.41
## fluid            0.49
##
## [[9]]
##              2010-10-30 2012-05-10
## pulse           85.00      69.00
## temperature     98.84      98.82
## fluid            0.60       0.29
##
## [[10]]
##              2010-07-10 2013-01-06 2010-03-06 2010-01-28 2011-06-18
## pulse           98.00      85.00      81.00      63.00      83.00
## temperature     98.65      99.07      98.45      97.95      98.00
## fluid            0.79       0.50       0.67       0.94       0.69
##              2010-08-27
## pulse           66.00
## temperature     97.68
## fluid            0.36
```