3 Simulations Assignment

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Question 1: Drugs

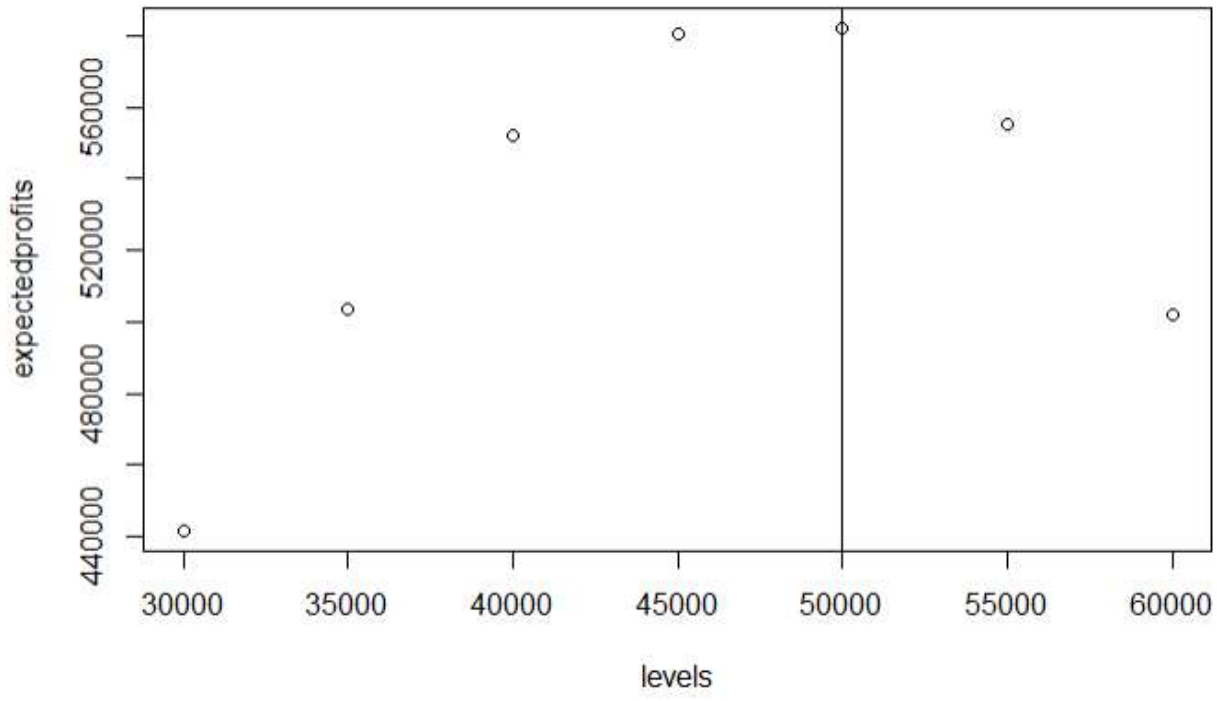
```
sims = 10000
years = 10
levels = c(30000, 35000, 40000, 45000, 50000, 55000, 60000)
mean = 50000
standarddev = 12000
onetime = 16
price = 3.7
variable = .2
OH = .4




profits = cbind(rep(0, 10000), rep(0, 10000), rep(0, 10000), rep(0, 10000),
rep(0, 10000), rep(0, 10000), rep(0, 10000))
for(i in 1:sims) {
  demand = rnorm(10, mean, standarddev)
  for(j in 7:1){
    produce = demand
    produce[produce > levels[j]] = levels[j]
    revenue = price * sum(produce)
    cost = variable * sum(produce) + OH * levels[j] * years + onetime *
levels[j]
    profits[i,j] = revenue - cost
  }
}
```

```
[1] 441683.8 503720.1 552196.6 580337.1 582271.3 555333.8 502153.8
```

```
expectedprofits = c(mean(profits[,1]), mean(profits[,2]), mean(profits[,3]),
mean(profits[,4]), mean(profits[,5]), mean(profits[,6]), mean(profits[,7]))
expectedprofits
```



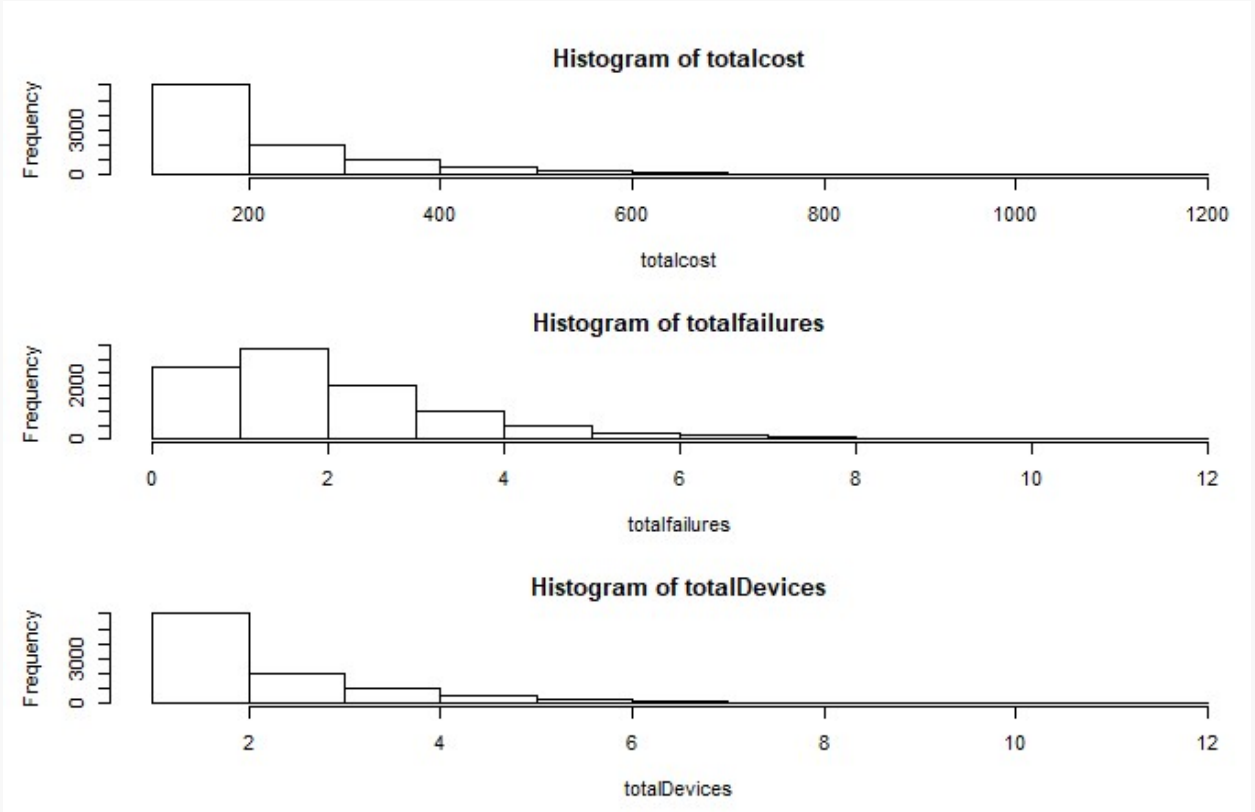

```
       5%       95%
445396.9 696949.9
```

In order to get the greatest profit return, you should have the capacity of 50,000 units. We can say with 95% certainty that our profit will be in between $445,396.90 and $696949.90

Question 2: Warranty

```
library(plyr)
alpha <- 2
beta <- .5
avrg <- alpha*beta
std.dv <-sqrt(alpha*beta^2)
x<-50
range<- 10000
totalfailures<-rgamma(range,alpha,rate=1)
totalcost<-totalfailures*100
totalcost<-round_any(totalcost,100,f=ceiling)
totalDevices<-totalcost/100
mean(totalcost)
mean(totalfailures)
mean(totalDevices)
```

```
[1] 248.97
[1] 1.987646
[1] 2.4897
```



On average, an individual's phone breaks 2.5 times and occurs close to two failures. You have a pretty good chance of breaking the phone in the first year, so you are better off using the warranty.

Question 3: Clearance

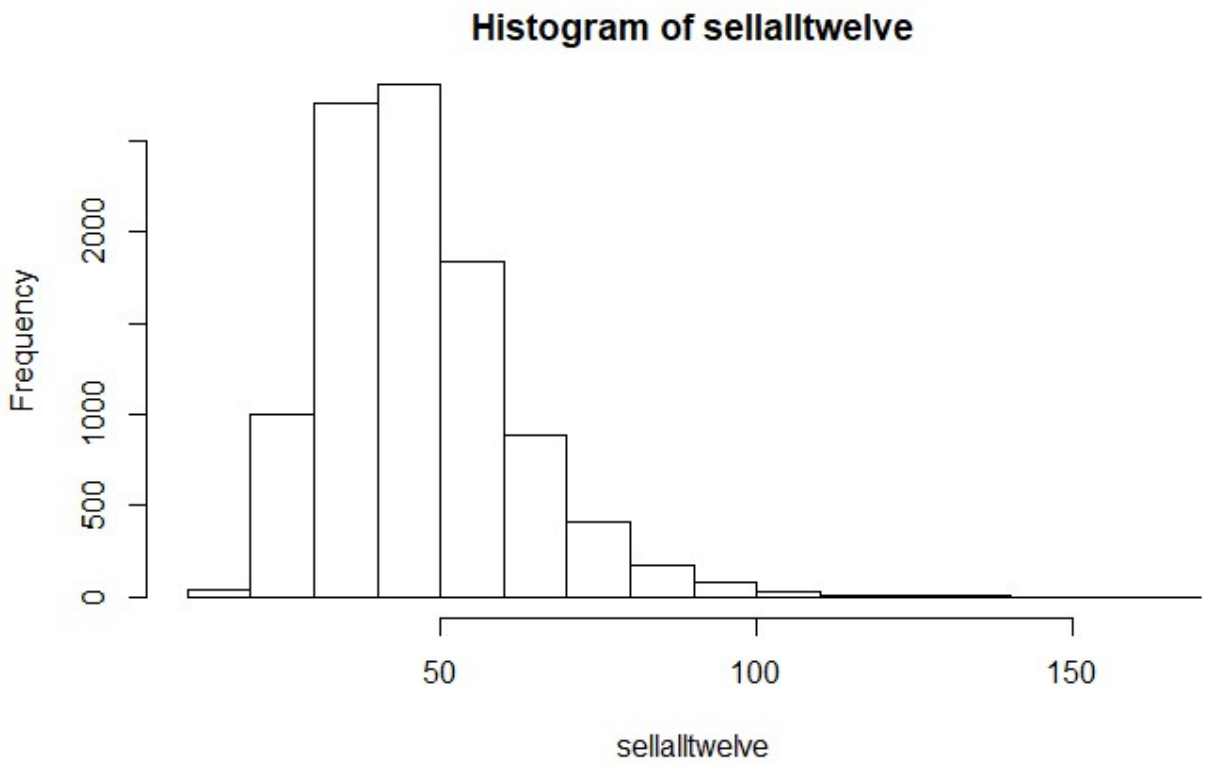
```
sims <- 10000 #number of times it is going to run
pincomingcustomers <- c(.15, .25, .3, .2, .1) #number of customers that come
```

```
in percentage
incomingcustomers <- c(0:4); #potential customers
chance <- .6 #chance they buy a washer
buyingchoicemachine <- c(.4, .35, .25) #percentage of buying what type of
machine
diffmachine <- c(5, 4, 3)#different potential machines

sellalltwelve <- rep(0, sims) #how long it will take to sell 12
for(i in 1:sims){
  days = 0 # number of days
  machinesleft = c(5, 5, 5, 5, 5, 4, 4, 4, 4, 3, 3, 3) #what machines are
left
  while(length(machinesleft) > 0){
    customersim <- sample(x =incomingcustomers, prob = pincomingcustomers,
size = 1) #how many customers will come in
    bought <- rbinom(1, customersim, chance)
    if(bought == 1){
      soldmachines <- sample(x = diffmachine, prob = buyingchoicemachine,
size = bought, replace = T)
      sold <- c() #if they can buy their choice machine, it gets added to the
vector
      for(j in soldmachines){
        if(j %in% machinesleft){
          sold <- c(sold, j)
        }
      }
      for(b in sold){
        bought <- match(b, machinesleft)
        machinesleft <- machinesleft[-bought]
      }
    }
    days = days + 1
  }
  sellalltwelve[i] = days
}
```

```{r pressure, echo=FALSE}
mean(sellalltwelve)
hist(sellalltwelve)
```

```
[1] 46.9928
```



Across multiple simulations, the average amount of days to sell all 12 washers is 46. I would put on a sale to get the washers out the door!