Problem 5

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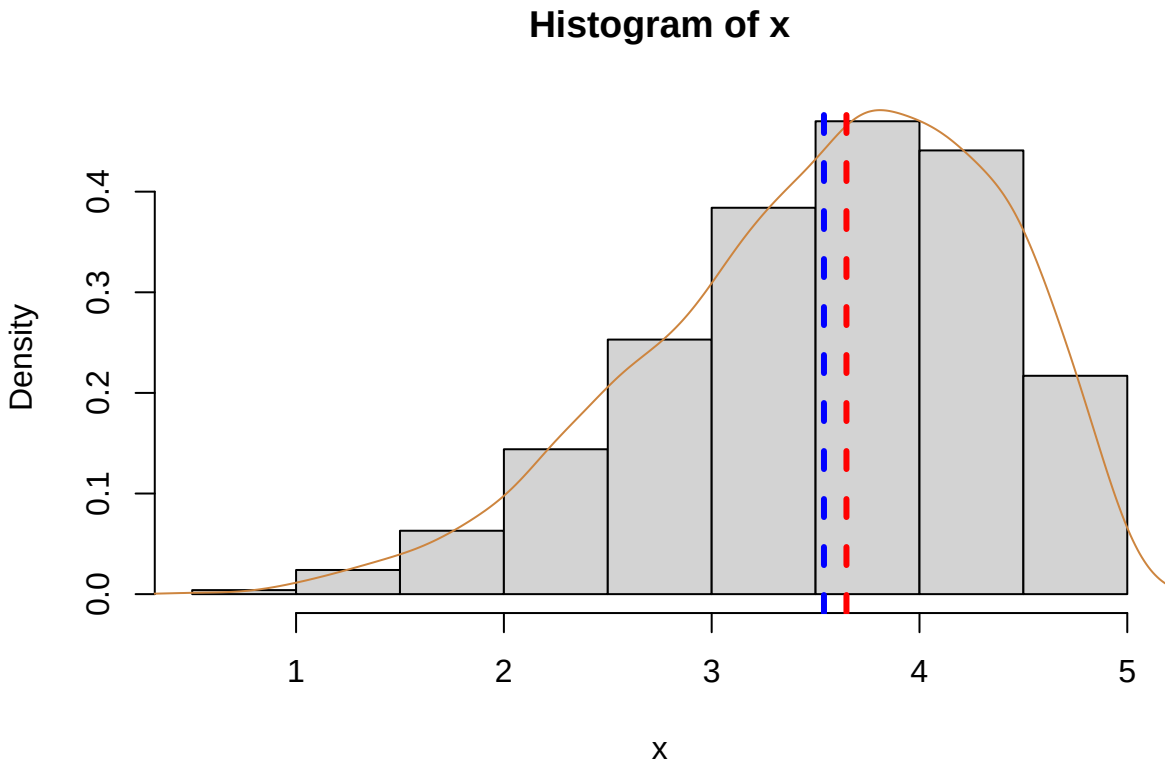
The answers for problem 1 to 4 are in another pdf file.

Problem 5: Select a skewed distribution from which to sample. Using R, demonstrate the convergence of the mean value of your samples to the Normal distribution. Assume you are making this demonstration to someone who has little or no statistical training. Your demonstration should take no more than 10 minutes. Along with your code, outline the commentary you would use in your demonstration.

First, using the rbeta function to generate 2000 random variables between 0 and 5. The distribution of x is left-skewed.

```
set.seed(123)
x=rbeta(2000,5,2)*5
hist(x, freq=FALSE)
lines(density(x), col='peru', lwd=1)
abline(v = c(mean(x),median(x)),  col=c("blue", "red"), lty=c(2,2), lwd=c(3, 3))
```




```
round(mean(x),3)
```

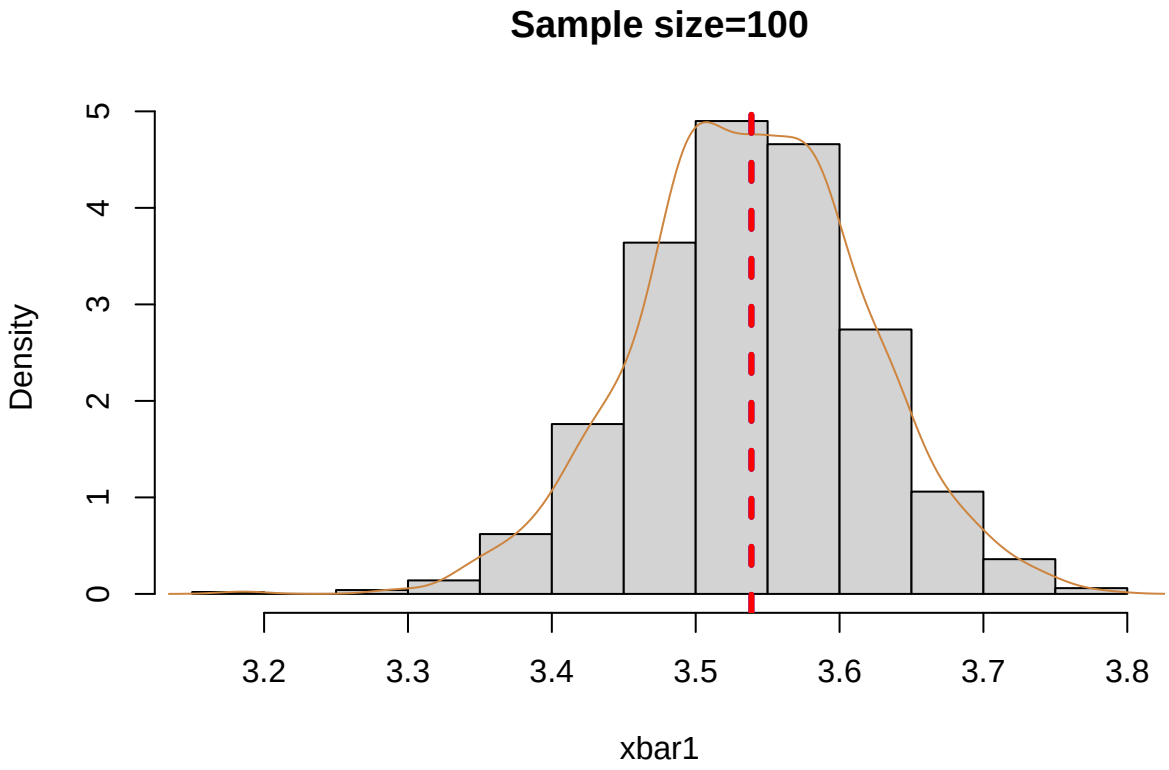
```
## [1] 3.54
```

```
round(sd(x),3)
```

```
## [1] 0.812
```

We use 4 sample sizes: 100, 150, 200, 500. As the size gets larger, the curve becomes closer to the normal distribution.

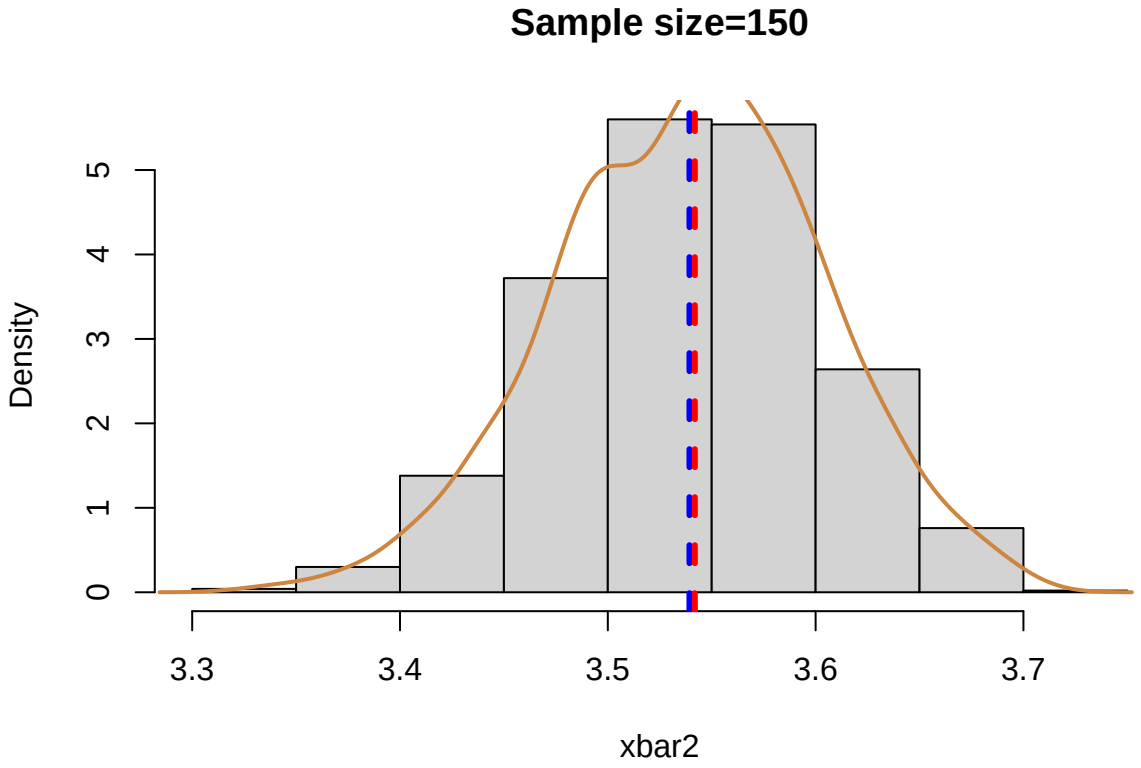
```
n<-1000
samplesize1<-100
xbar1<-rep(NA,n)
for (i in 1:n){
  sample1<-sample(x,samplesize1)
  xbar1[i]<-mean(sample1)
}
hist(xbar1, freq=FALSE,main="Sample size=100")
lines(density(xbar1), col='peru', lwd=1)
abline(v = c(mean(xbar1),median(xbar1)),  col=c("blue", "red"), lty=c(2,2), lwd=c(3, 3))
```




```
round(mean(xbar1),3)
```

```
## [1] 3.539
```

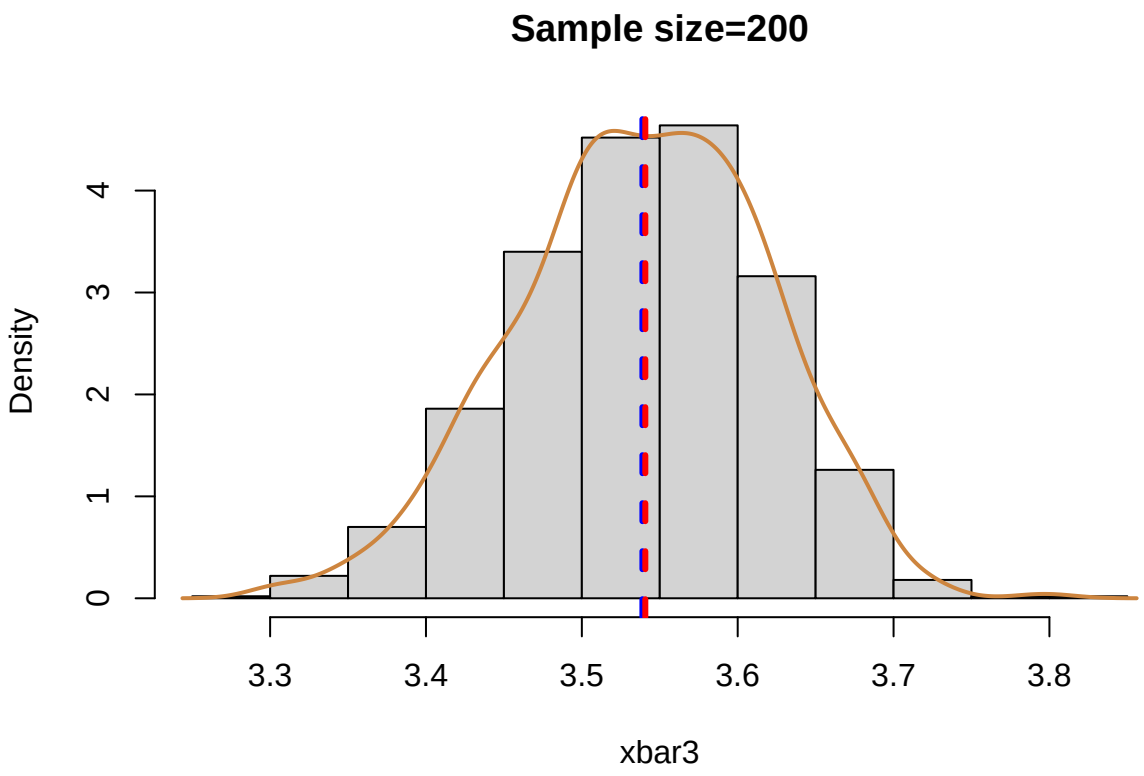
```
samplesize2<-150
xbar2<-rep(NA,n)
for (i in 1:n){
  sample2<-sample(x,samplesize2)
  xbar2[i]<-mean(sample2)
}
hist(xbar2, freq=FALSE,main="Sample size=150")
lines(density(xbar2), col='peru', lwd=2)
abline(v = c(mean(xbar2),median(xbar2)),  col=c("blue", "red"), lty=c(2,2), lwd=c(3, 3))
```



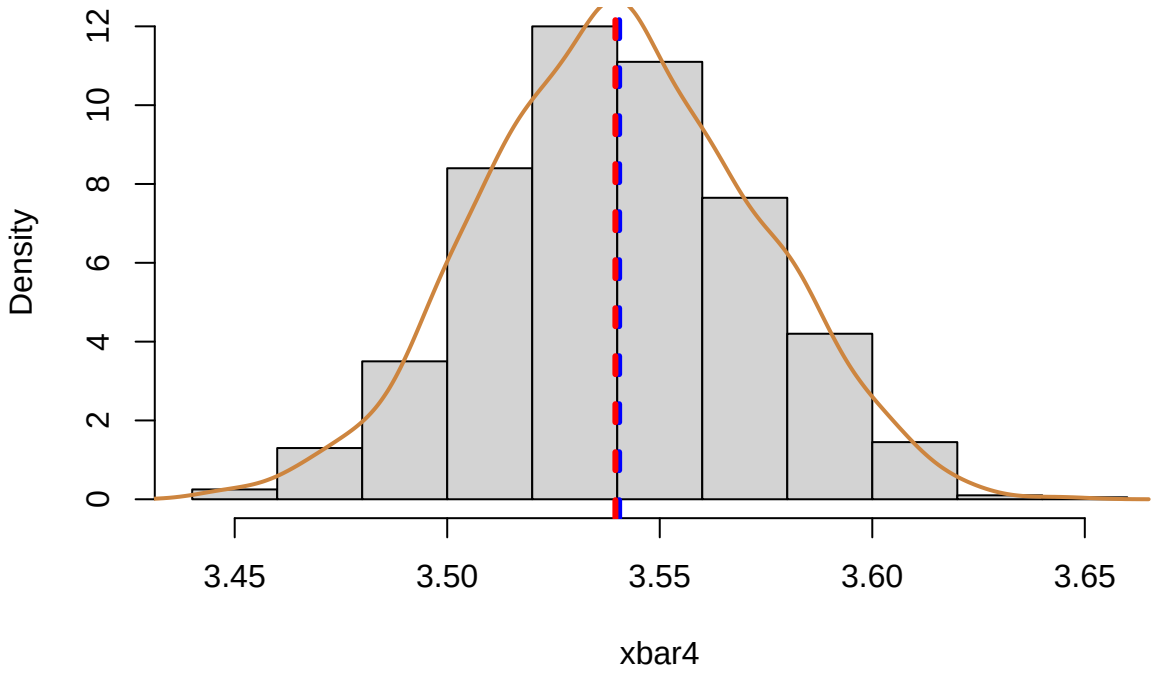

```
round(mean(xbar2),3)
```

```
## [1] 3.539
```

```
samplesize3<-200
xbar3<-rep(NA,n)
for (i in 1:n){
  sample3<-sample(x,samplesize1)
  xbar3[i]<-mean(sample3)
}
hist(xbar3, freq=FALSE,main="Sample size=200")
lines(density(xbar3), col='peru', lwd=2)
abline(v = c(mean(xbar3),median(xbar3)),  col=c("blue", "red"), lty=c(2,2), lwd=c(3, 3))
```




```
samplesize4<-500
xbar4<-rep(NA,n)
for (i in 1:n){
  sample4<-sample(x,samplesize4)
  xbar4[i]<-mean(sample4)
}
hist(xbar4, freq=FALSE,main="Sample size=500")
lines(density(xbar4), col='peru', lwd=2)
abline(v = c(mean(xbar4),median(xbar4)),  col=c("blue", "red"), lty=c(2,2), lwd=c(3, 3))
```




```
round(mean(xbar3),3)
```

```
## [1] 3.539
```

```
round(mean(xbar4),3)
```

```
## [1] 3.54
```