SMML assignment -04

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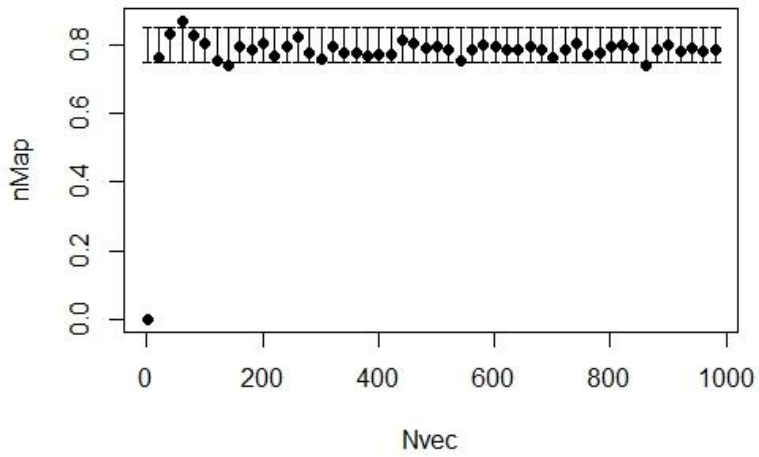
Question 5: error bars

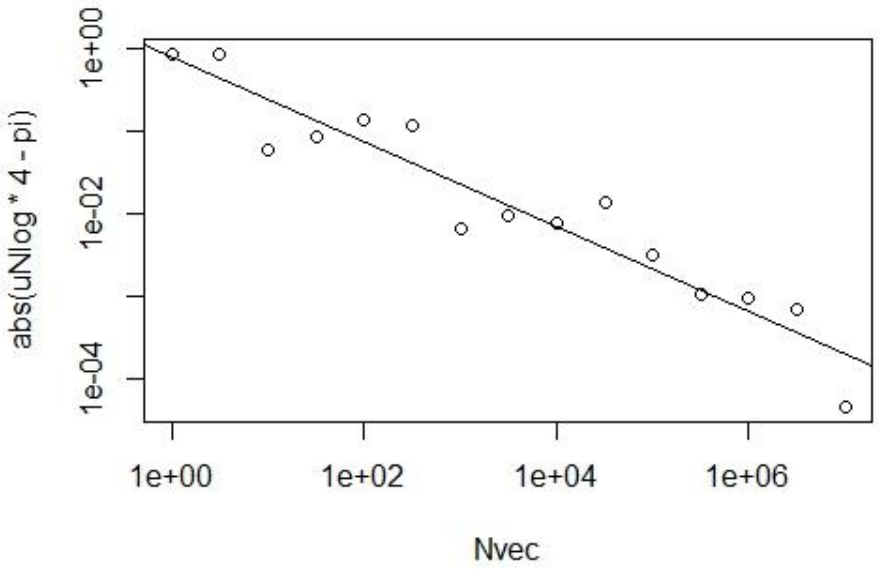
```
Nvec=seq(1,1000,20)
nMap=sapply(Nvec,muMap)
plot(Nvec,nMap)
```
errbar(Nvec,nMap,0.85,0.75)



Question 11 :

```
Nvec=10^seq(0,7,0.5)
uNlog=sapply(Nvec,muMap)
plot(abs(uNlog*4-pi)~Nvec, log='xy')

y=log10(abs(uNlog*4-pi))
x=log10(Nvec)
fit=lm(y~x)
plot(x,y)
abline(fit)
```

```
print(fit$coef)
```

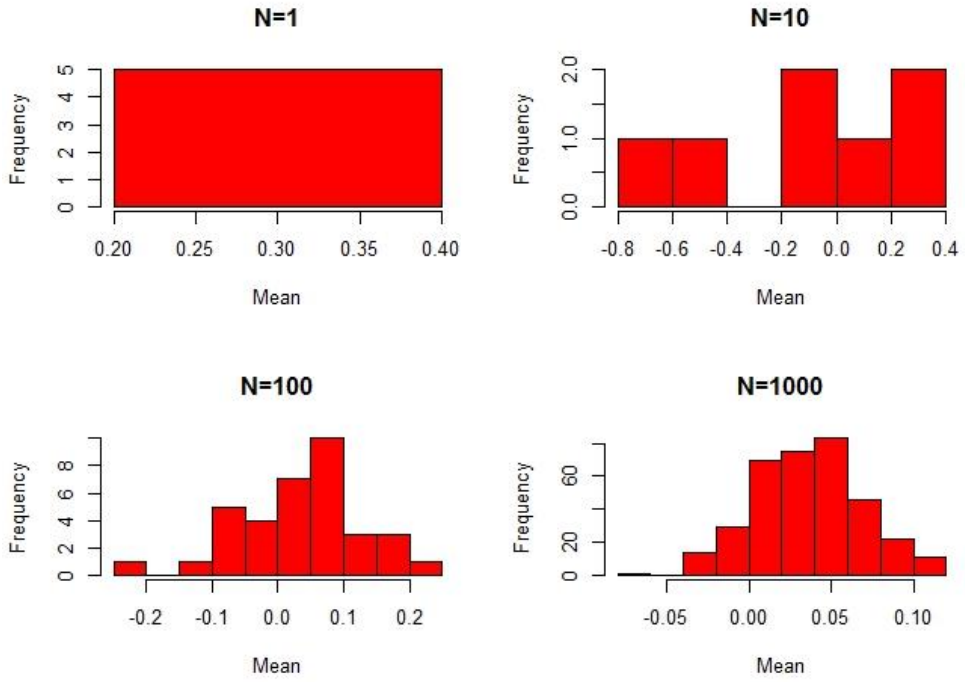


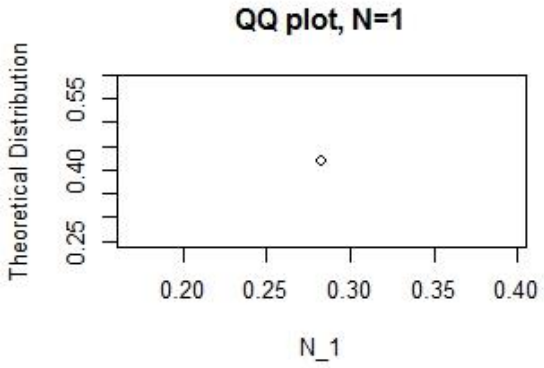
the code gives the plot for the log value of Nvec(10^seq(0,7,0.5)) after applying the function muMap. Along with the uNlog.
the graphs tells us about the relationship between Nvec with its muMap values. Which seems to be a negative correlation. As Nvec gets higher in value, the muMap decreases

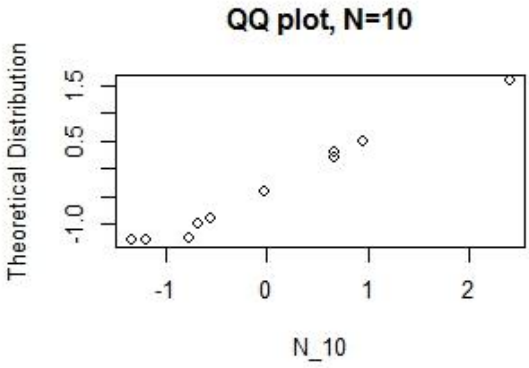
Question 18 :

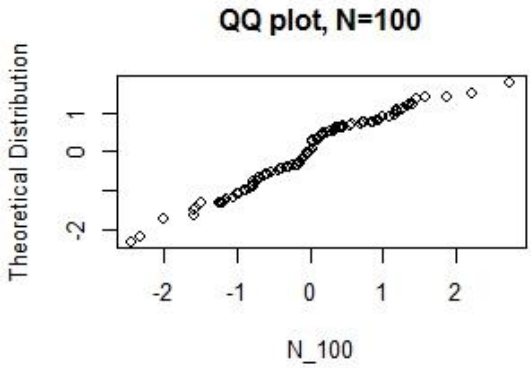
```
N_1=rnorm(1,mean=0,sd=1)
Mean_values_1 <- c()
for (i in 1:5){
  M <- sample(N_1,replace=T)
  Mean_values_1[i] <- mean(M)
}

#### N = 10

N_10 <- rnorm(10,mean=0,sd=1)
Mean_values_10 <- c()
for (i in 1:7){
  M <- sample(N_10,replace=T)
  Mean_values_10[i] <- mean(M)
}

#### N = 100

N_100=rnorm(100,mean=0,sd=1)
Mean_values_100 <- c()
for (i in 1:35){
  M <- sample(N_100,replace=T)
```

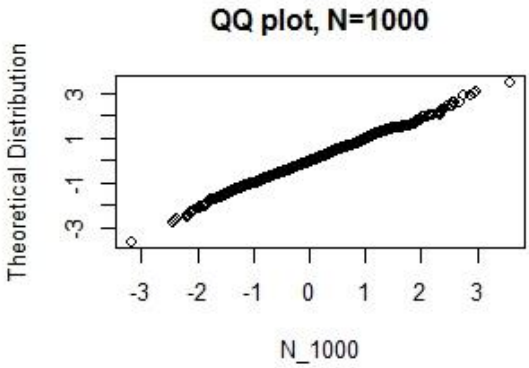
```
  Mean_values_100[i] <- mean(M)
}

#### N = 1000

N_1000=rnorm(1000,mean=0,sd=1)
Mean_values_1000 <- c()
for (i in 1:350){
  M <- sample(N_1000,replace=T)
  Mean_values_1000[i] <- mean(M)
}

par(mfrow=(c(2,2)))
hist(Mean_values_1,col='red',main='N=1',xlab='Mean')
hist(Mean_values_10,col='red',main='N=10',xlab='Mean')
hist(Mean_values_100,col='red',main='N=100',xlab='Mean')
hist(Mean_values_1000,col='red',main='N=1000',xlab='Mean')

par(mfrow=(c(2,2)))
qqplot(N_1,rnorm(1,mean=0,sd=1),main='QQ plot, N=1',ylab='Theoretical Distribution')
qqplot(N_10,rnorm(10,mean=0,sd=1),main='QQ plot, N=10',ylab='Theoretical Distribution')
qqplot(N_100,rnorm(100,mean=0,sd=1),main='QQ plot, N=100',ylab='Theoretical Distribution')
qqplot(N_1000,rnorm(1000,mean=0,sd=1),main='QQ plot, N=1000',ylab='Theoretical Distribution')
```




QQ plot, N=1
Theoretical Distribution
0.25
0.40
0.55
0.20
0.25
0.30
0.35
0.40
N_1


QQ plot, N=10
Theoretical Distribution
-1.0
0.5
1.5
-1
0
1
2
N_10


QQ plot, N=100
Theoretical Distribution
-2
0
1
-2
-1
0
1
2
N_100


QQ plot, N=1000
Theoretical Distribution
-3
-1
1
3
-3
-2
-1
0
1
2
3
N_1000