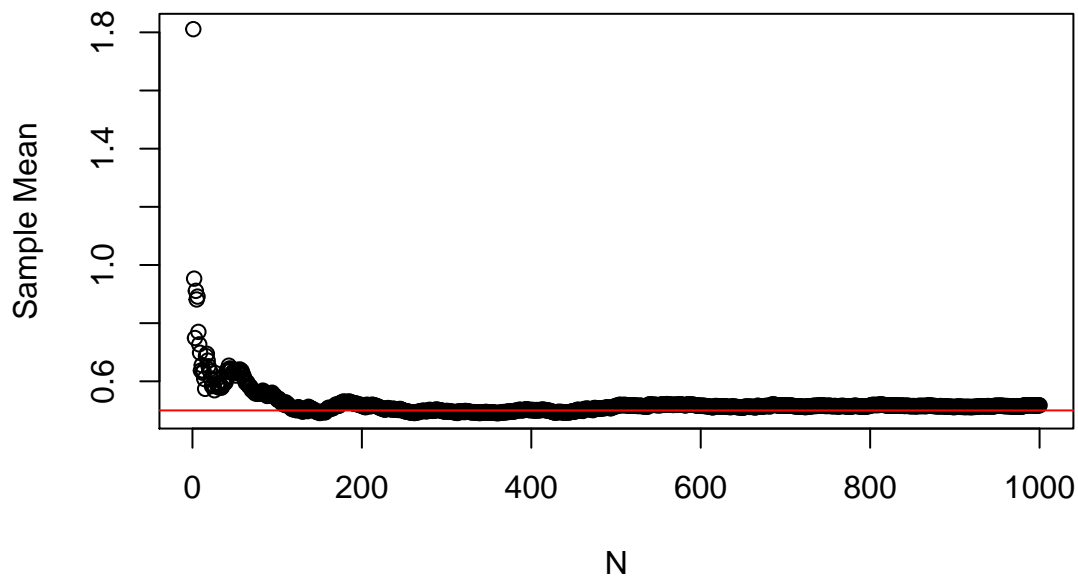# Problem Sheet 3

Statistics 2

Dom Hutchinson

Question 3

```
N<-1000
X<-rexp(N,rate=2)

X_bar<-cumsum(X) / 1:N

plot(1:N,X_bar,main="Means of samples of increasing size", xlab="N",ylab="Sample Mean")
abline(h=.5,col="red")
```

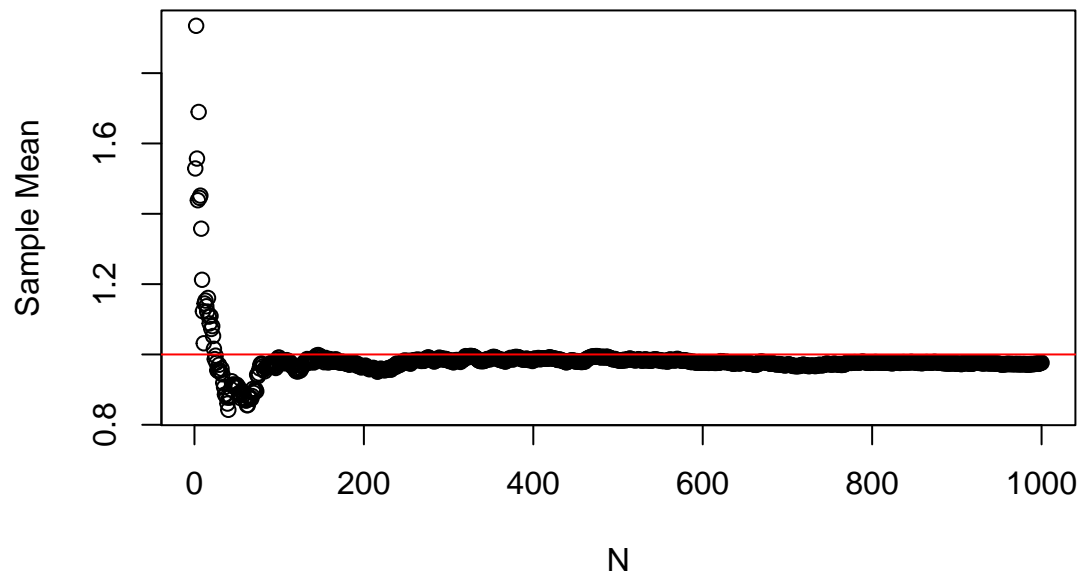### Means of samples of increasing size


```
alpha<-2; lambda<-2
X<-rgamma(N,shape=alpha,rate=lambda)

X_bar<-cumsum(X) / 1:N
mu<-alpha/lambda

plot(1:N,X_bar,main="Means of samples of increasing size", xlab="N",ylab="Sample Mean")
abline(h=mu,col="red")
```

Means of samples of increasing size

Question 4

```r
N<-1000
X<-rexp(N,rate=2)

Fx<-mean(X<=1.5)
cat("Prediction:",Fx," True:",pexp(1.5,rate=2))

## Prediction: 0.954  True: 0.9502129
```

```r
alpha<-2; lambda<-2
X<-rgamma(N,shape=alpha,rate=lambda)

Fx<-mean(X<=1.5)
cat("Prediction:",Fx," True:",pgamma(1.5,shape=alpha,rate=lambda),"\n")

## Prediction: 0.831  True: 0.8008517
```

```r
Fx<-mean(.5<=X & X<=1.5)
cat("Prediction:",Fx," True:",pgamma(1.5,shape=alpha,rate=lambda)-pgamma(.5,shape=alpha,rate=lambda))

## Prediction: 0.544  True: 0.5366106
```