**# Montecarlo Simulation#**

runif(n=1,min=0,max=1)

runif(n=1000,min=0,max=1)

runif(n=1000)

random.uniform.1000<-runif(n=1000,min=0,max=1)

hist(random.uniform.1000)

# Normal Distribution

random.normal.100<-rnorm(n=100,mean=5,sd=2)

par(mfrow=c(3,1))

plot(random.normal.100)

boxplot(random.normal.100)

hist(random.normal.100)

**# Mean**

mean(random.normal.100)

sd(random.normal.100)

**# Repeat the experiment**

random.normal.100.1<-rnorm(100,5,2)

random.normal.100.2<-rnorm(100,5,2)

random.normal.100.3<-rnorm(100,5,2)

random.normal.100.4<-rnorm(100,5,2)

par(mfrow=c(2,2))

hist(random.normal.100.1)

hist(random.normal.100.2)

hist(random.normal.100.3)

hist(random.normal.100.4)

**# Mean**

mean(random.normal.100.1);mean(random.normal.100.2);mean(random.normal.100.3);mean(random.normal.100.4)

**#replication**

random.normal.100.rep<-replicate(n=4,rnorm(100,5,2))

random.normal.100.rep

**par(mfrow=c(2,2))**

apply(X=random.normal.100.rep,MARGIN = 2,FUN = hist)

apply(X=random.normal.100.rep,MARGIN = 2,FUN=mean)

apply(X=random.normal.100.rep,2,sd)

apply(random.normal.100.rep,2,mean)

**# Repeat for lower sample size**

norm.sim.all.3<-replicate(n=4,rnorm(25,5,2))

summary(norm.sim.all.3)

apply(norm.sim.all.3,2,mean)

apply(norm.sim.all.3,2,sd)

**# Repeat it for larger sample size**

norm.sim.all.4<-replicate(n=4,rnorm(1000,5,2))

summary(norm.sim.all.4)

apply(norm.sim.all.4,2,mean)

apply(norm.sim.all.4,2,sd)

**# Let us find a regression Model using Monte carlo simulation**

#Y~N(a+b\*x,sd)

par(mfrow=c(2,2))

a=5

b=0.7

x<-seq(2,20)

y\_fixed<-a+b\*x

plot(y\_fixed~x,main="Deterministic component of the linear model")

abline(a=5,b=0.7)

y.sim<-rnorm(length(x),mean = y\_fixed,sd=2)

plot(y.sim~x)

abline(a=5,b=0.7)

# Actaul Parameter estimates for the regression

y.sim.lm<-lm(y.sim~x)

summary(y.sim.lm)

confint(y.sim.lm)

abline(reg = y.sim.lm,lty=2)