Consistency for Cauchy Distribution

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#Consistency-I  
#Simulation from cauchy distribution  
#Q.1   
#Based on the random samples generated from Cauchy(mu,1). Check the consistency of the estimators T1=xbar and T2=Sample Median for the parameter mu. Construct the following table.

rm(list = ls(all=TRUE))  
mu=1.4; #mu  
sigma=1; #var  
eps=0.1; #epsilon  
n=50; #no of samples  
x=matrix(rcauchy(n\*n,mu,sigma),n,n);  
T\_1=apply(x,1,mean);  
T\_2=apply(x,1,median);  
A=abs(T\_1-mu)<eps;  
est.prob\_1=sum(A)/n;  
B=abs(T\_2-mu)<eps;  
est.prob\_2=sum(B)/n;  
cbind(n,est.prob\_1,est.prob\_2)

## n est.prob\_1 est.prob\_2  
## [1,] 50 0.08 0.26

#OR

rm(list=ls(all=T))  
mu=1.4;  
sigma=1;  
eps=0.1;  
n=c(50,100,200,500,700,1000);  
est\_prob1=0;est\_prob2=0;  
for (i in 1:length(n))  
{  
 x=matrix(rcauchy(n[i]\*n[i],mu,sigma),n[i],n[i])  
 T1=apply(x,1,mean); #samples means  
 T2=apply(x,1,median); #samples median  
 est\_prob1[i]=mean(abs(T1-mu)<eps)  
 est\_prob2[i]=mean(abs(T2-mu)<eps)  
   
}  
cbind(n,est\_prob1,est\_prob2)

## n est\_prob1 est\_prob2  
## [1,] 50 0.02000000 0.3000000  
## [2,] 100 0.04000000 0.5500000  
## [3,] 200 0.05000000 0.6800000  
## [4,] 500 0.05800000 0.8580000  
## [5,] 700 0.05714286 0.9057143  
## [6,] 1000 0.06300000 0.9560000

#Sample mean is not Consistent for mu.  
#Sample median is Consistent for mu.