Joe Sinotte

clear

clc

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%% Question 1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

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for i = 1:500

j = 10000\*i;

x = randn(1,j);

n = length(x);

theta1(i) = (1/n)\*sum(x);

sig2(i) = (1/n)\*sum((x-theta1(i)).^2);

k(i) = (1/n)\*sum((x-theta1(i)).^4);

vtheta1(i) = var(theta1);

vsig2(i) = var(sig2);

vk(i) = var(k);

i

end

figure(1)

plot(theta1)

xlabel('Sample Size (in 10,000s)')

ylabel('Mean')

figure(2)

plot(sig2)

xlabel('Sample Size (in 10,000s)')

ylabel('Variance')

figure(3)

plot(k)

xlabel('Sample Size (in 10,000s)')

ylabel('Kurtosis')

figure(4)

plot(vtheta1)

xlabel('Sample Size (in 10,000s)')

ylabel('Variance of Mean')

figure(5)

plot(vsig2)

xlabel('Sample Size (in 10,000s)')

ylabel('Variance of Sigma^2')

figure(6)

plot(vk)

xlabel('Sample Size (in 10,000s)')

ylabel('Variance of Kurtosis')

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%%%%%%%%%%%%%%%%%%%%%%%%%%%% Question 2 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

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for a = 1:500

k = 5000\*a;

y1 = exprnd(1,1,k);

y2 = rand(1,k);

n1 = length(y1);

n2 = length(y2);

theta2\_2(a) = (1/n2)\*(sum(exp(-y2)));

R = zeros(1,n1);

for i = 1:n1

if (y1(i)<1)

R(i) = 1;

end

end

M(a) = sum(R);

theta2\_1(a) = M(a)/n1;

end

figure(7)

plot(theta2\_1)

xlabel('Sample Size (in 5000s)')

ylabel('Theta')

figure(8)

plot(theta2\_2)

xlabel('Sample Size (in 5000s)')

ylabel('Theta')

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%%%%%%%%%%%%%%%%%%%%%%%%%%%%% Question 3 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

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rand('seed', 0);

n = round(10.^(1:0.1:6));

for k = 1:length(n)

x = exprnd(1,1,n(k));

y = exprnd(x);

p1(k) = mean(x.\*y<=3);

p2(k) = mean(1-exp(-3./(x.^2)));

end

figure(9)

plot(log10(n), p1, 'b-o', log10(n), p2, 'r-o')

QUESTION 1:





QUESTION 2:

QUESTION 3:

