Kelsey Nguyen

Matlab 2

October 17, 2017

**ECE 352: Gaussian Variable**

Gaussian function is the probability density function of the normal distribution follows by the formula . The purpose of this matlab is to confirm if the function randn() produces a Gaussian random variable.

The program was divided into a couple part. Everything was declared first. The randn() was generating 10,000 random numbers, and it was plotted with a histogram plot. The histogram was normalized by multiplied by the bin which was set to 25. Two of the plot was plotted in the same figure. This can be performed by using the subplot () command. In plot 1, the mean was set to 0 and standard deviation was set to 1. In plot 2, the mean was set to 1 and standard deviation was set to 1.5. The x- axis was set from -6 to 6 and y-axis from 0 to .5. The theoretical curve was plotted as a line by using the plot() command, and the histogram was graphed with a bar chart by using the bar() command. Histogram shows how many value fall into a certain range, and the grid on command helped human to see the value more precise.

Overall, the experiment was good. This matlab gave students a good chance to experience and understand more about matlab. There was a certain order that the code needed to be in and more command line was learned through this experiment. The experiment also helped students see how the Gaussian works.

X =-5:0.1:5;% x-axis to plot agaisnt random variable

L=10000; %length of the random vector

bins=25;

% standard normal gausian

mu=0;sigma=1;%mean=0,variance=1

mu1=1;sigma1=1.5;%mean=1,variance=1.5

%random methods

R = randn(L,1)\*sigma + mu;

R1 = randn(L,1)\*sigma1 + mu1;

% Graph 1

subplot(2,1,1)

[f,x]=hist(R,bins)

bar(x,f/trapz(x,f)); hold on; ;%bar chart plot

f12\_x= (1/sqrt(2\*pi\*sigma\*sigma))\* exp((-X.^2)/(2\*sigma\*sigma)); ));%plot estimated pdf from the

hold on; plot(X,f12\_x,'r--'); %plot computed theoretical PDF

axis([-6 6 0 .5])

hold off; grid on;

% labels of graph1

title('Theoretical PDF and Simulated Histogram 1');

legend('Histogram','Theoretical PDF');

xlabel('x');

ylabel('Gaussian R.V PDF');

% Graph 2

subplot(2,1,2)

[f,x]=hist(R1,bins)

bar(x,f/trapz(x,f)); hold on;%bar chart plot

f2\_x= (1/sqrt(2\*pi\*sigma1\*sigma1))\* exp((-(X-mu1).^2)/(2\*sigma1\*sigma1));%plot estimated pdf from the generated data

%f2\_x = pdf('Normal',X,mu1,sigma1); %theoretical normal probability density

hold on; plot(X,f2\_x,'r--'); %plot computed theoretical PDF

axis([-6 6 0 .5])

hold off; grid on;

% labels of graph2

title('Theoretical PDF and Simulated Histogram 2');

legend('Histogram','Theoretical PDF');

xlabel('x');

ylabel('Gaussian R.V PDF');

