Almustaqbal University
Engineering And Technical Engineering
Computer Techniques Engineering Department

Information Theory Laboratory

Class :- 4^{th}

Lectuer 1

Normal Distribution

By

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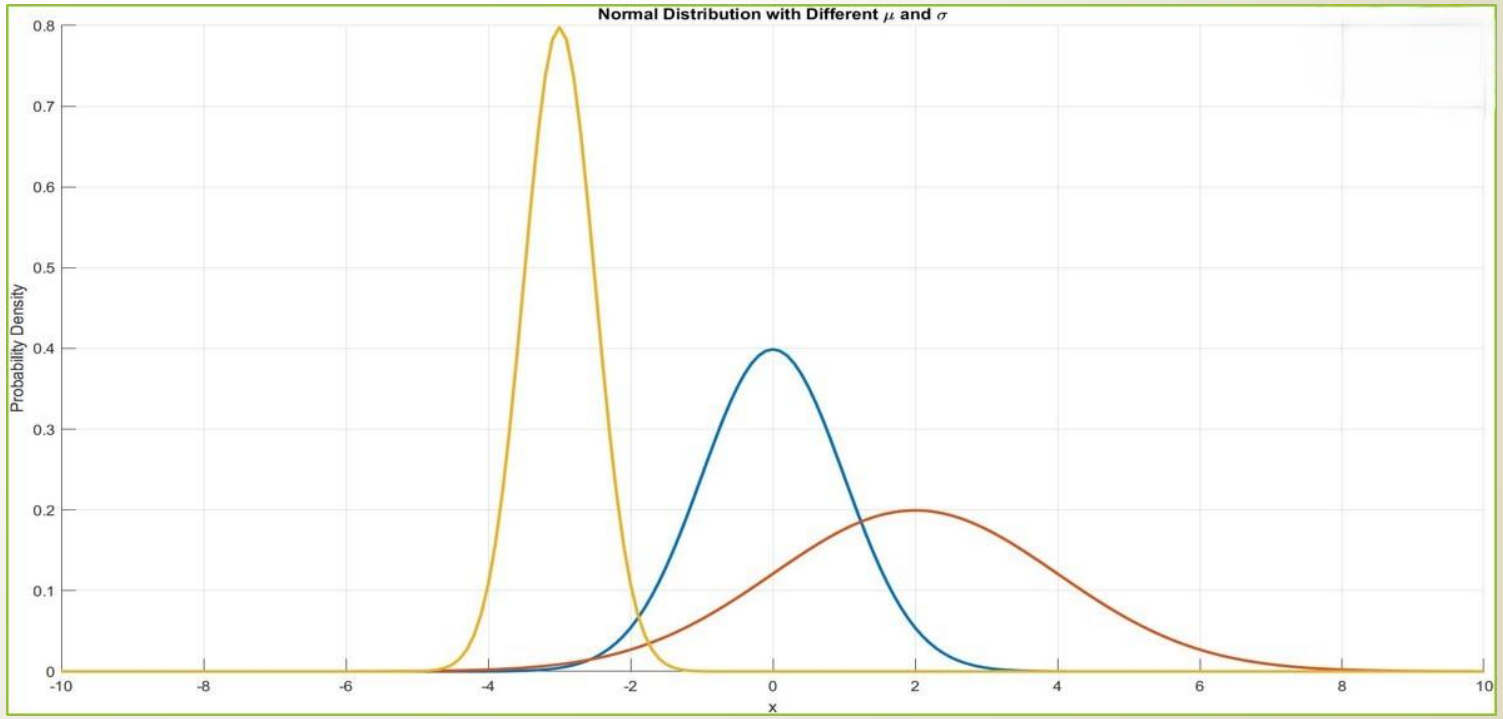
Experiment No. 1 " Normal Distribution "

The experiment aims to plot and understand the **Normal Distribution**, which is a probability distribution with a bell-shaped curve that describes many types of data in nature, engineering, and statistics. In this experiment, we study how the values of the **mean (μ)** and the **standard deviation (σ)** affect the shape of the curve is given by :

$$h=\frac{1}{\sigma\sqrt{2\pi}}e^{-0.5(\frac{x-\mu}{\sigma})^2}$$



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Objective:

To study the probability density function of the normal distribution and understand the effect of **the mean (μ)** and **the standard deviation (σ)** on the shape of the curve.

Experiment Steps:

1.Define the variable x:

- Set x=[−4:0.1:4].
- This range approximately covers μ ± 4σ when σ =1.

2.Use the probability density function:

- Apply the command: H = normpdf (x, μ, σ)
- This computes the values of the normal distribution for the given **μ and σ**.

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3.Plot the results:

- Use plot(x, h) to visualize the bell-shaped curve of the normal distribution.

4.Experiment with multiple values:

- Change **μ (mean)** to **shift** the curve **left or right**.
- Change σ (standard deviation) to see how the curve becomes wider **(larger σ)** or narrower **(smaller σ)**.

MATLAB code

```
clc; clear; close all;
x = -4:0.1:4;
mu = 0;
sigma = 1;
h = normpdf(x, mu, sigma);
figure;
plot(x, h, 'b', 'LineWidth', 2);
xlabel('x');
ylabel('Probability Density');
title('Normal Distribution');
grid on;
```

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Result