# Practical I : Unit II
# Digital Signal Processing (ICE-410)

Mobarak Hosen Shakil
Roll: 1418006
Reg: 1321
Session: 14-15
Department of Information and Communication Engineering
Islamic University, Kushtia-7003, Bangladesh
Email: mhshakil_ice_iu@yahoo.com

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**Problem 1:** Use MATLAB to generate exponential signal of $x(t) = B * e^{(-a*t)}$ with (i) a decaying exponential where $a$ is positive and (ii) a growing exponential where $a$ is negative. If time interval from 0 to $1s$ and $a = 6, B = 5$.

**Solution:** To generate a decaying exponential signal, the mathematical equation is

$$x(t) = B * e^{(-a*t)} \tag{1}$$

and to generate a growing exponential signal, the mathematical equation is

$$x(t) = B * e^{(a*t)} \tag{2}$$

**Code:**

```
% Problem: Use MATLAB to generate exponential signal of x(t) = B?e^(?a?t) with (i)
  a decaying exponential where a is positive and (ii) a growing exponential where
  a is negative. If time interval from 0 to 1s and a= 6, B= 5.

clc;
clear;
a=6;
B=6;
t=0:0.001:1;
x=B*exp(-a*t);      %To generate decaying exponential graph
y=B*exp(a*t);       %To generate growing exponential graph
figure ();
plot(t, x);
figure ();
plot(t, y);
grid on;
```

To visualize a discrete-time signal, we may use the stem command. Specifically, $stem(n, x)$ depicts the data contained in vector $x$ as a discrete-time signal at the time values defined by $n$. The vectors $n$ and $x$ must have compatible dimension.

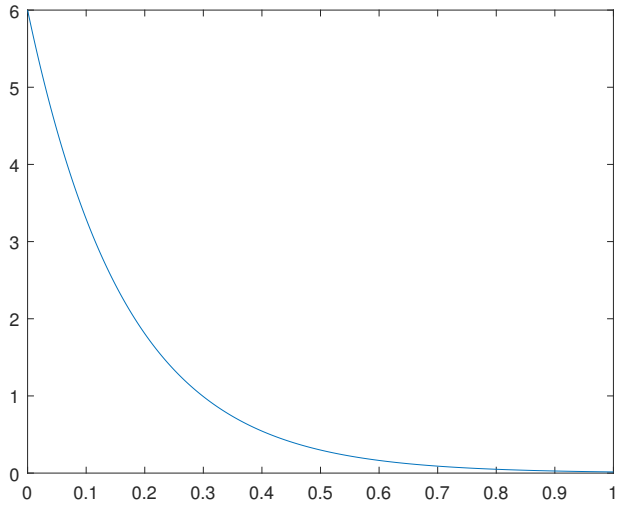


Figure 1: Continuous-time decaying exponential signal where $a > 0$, i.e., $a$ is positive.

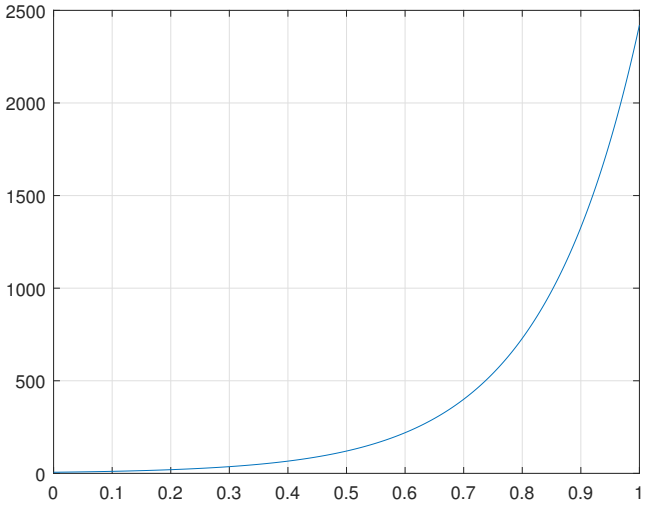


Figure 2: Continuous-time growing exponential signal where $a > 0$, i.e., $a$ is negative.