Experiment 2(b)

Title: Develop codes to simulate, and plot the results for an exponential signal:

$k\, e^{-at}\, u(t)$

for the cases:

a) k = 1 and a = 0.35

b) k = 1.2 and a = -0.45

Learning Objectives

i) To understand basic standard signals
ii) To have hands on simulation using python language

Prerequisites

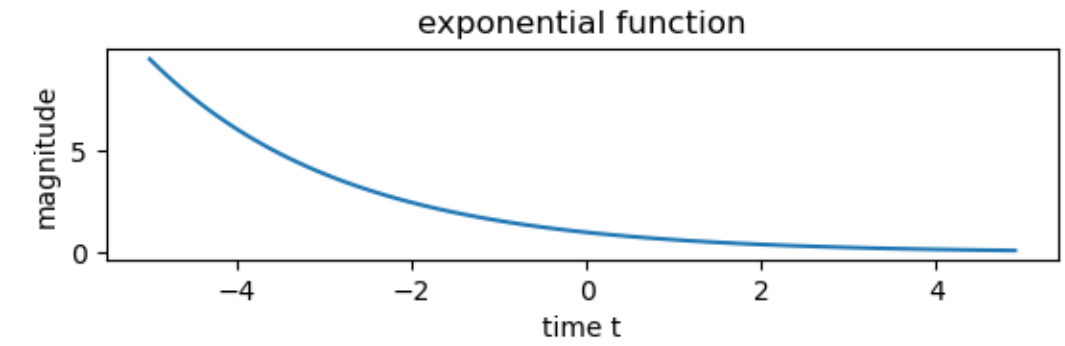
i) Basic understanding of mathematics
ii) Basic understanding of Python language

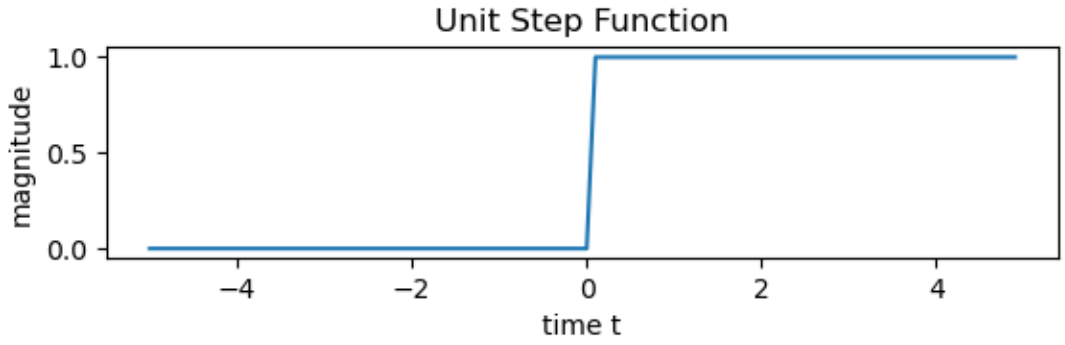
Theory

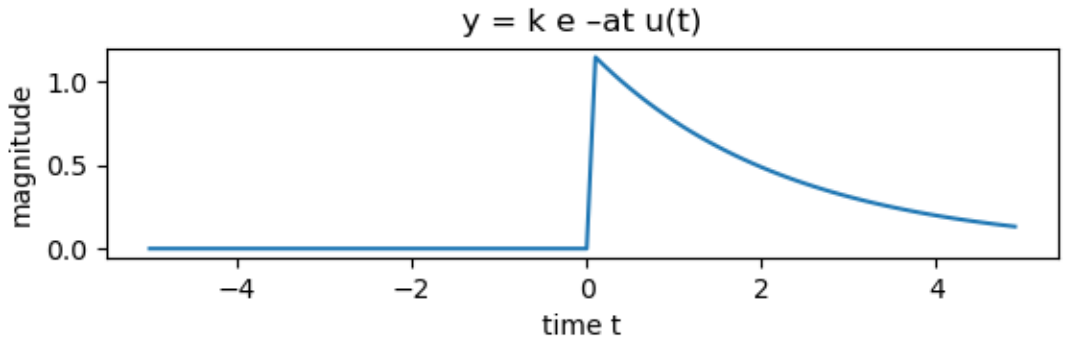
Simulation Code

```
import numpy as np
import matplotlib.pyplot as plt


UL = 5
LL = -5
t = np.arange(LL, UL, 0.1)


# Function to generate exponential signals e**(at)
def exponential(a, t):
    expo =[]
    for sample in t:
        expo.append(np.exp( a*sample))
    return (expo)


def unit_step(t):
    unit =[]
    for sample in t:
        if sample<0:
            unit.append(0)

        else:
            unit.append(1)
    return(unit)
```

```
k = 1.2
a = -0.45

exp_O = exponential(a, t)
unit_O = unit_step(t)

y = []
len_t = len(t)
for i in range(len_t):
    x = k * exp_O[i] * unit_O[i]
    y.append(x)


plt.subplot(3,1,1)
plt.plot(t, exp_O)
plt.title('exponential function')
plt.xlabel('time t')
plt.ylabel('magnitude')

plt.subplot(3,1,2)
plt.plot(t, unit_O)
plt.title('Unit Step Function')
plt.xlabel('time t')
plt.ylabel('magnitude')

plt.subplot(3,1,3)
plt.plot(t, y)
plt.title('k e –at u(t)')
plt.xlabel('time t')
plt.ylabel('magnitude')

plt.show()
```







Assignment

Task1: Write description for code
Task2: Vary the parameters of the signals and observe the output