WIGGLES

EXPERIMENT #08

OCTOBER 2022

EXPERIMENT NAME

Generation of different types of signals, using basic operations.

1. USING UNIT IMPULSE

Getting the environment ready

- **Python 3.10** is installed in the system and added to the system variables.
- The library is installed through pip i.e. through the command **“pip install wiggles.”**
- Here, **vs code** is used to code and test out the results.
- The code is written to best find the solution of the given problem and then is evaluated and displayed using the inbuilt **‘show()’** or the **‘compare()’** function in wiggles.

PROBLEM

- Generation of different types of signals, using operations involving **unit impulse signals.**
- Given,

$$x[n] = 2 \times \delta[n + 2] - \delta[n - 4]$$

Where, $-5 \leq n < 5$

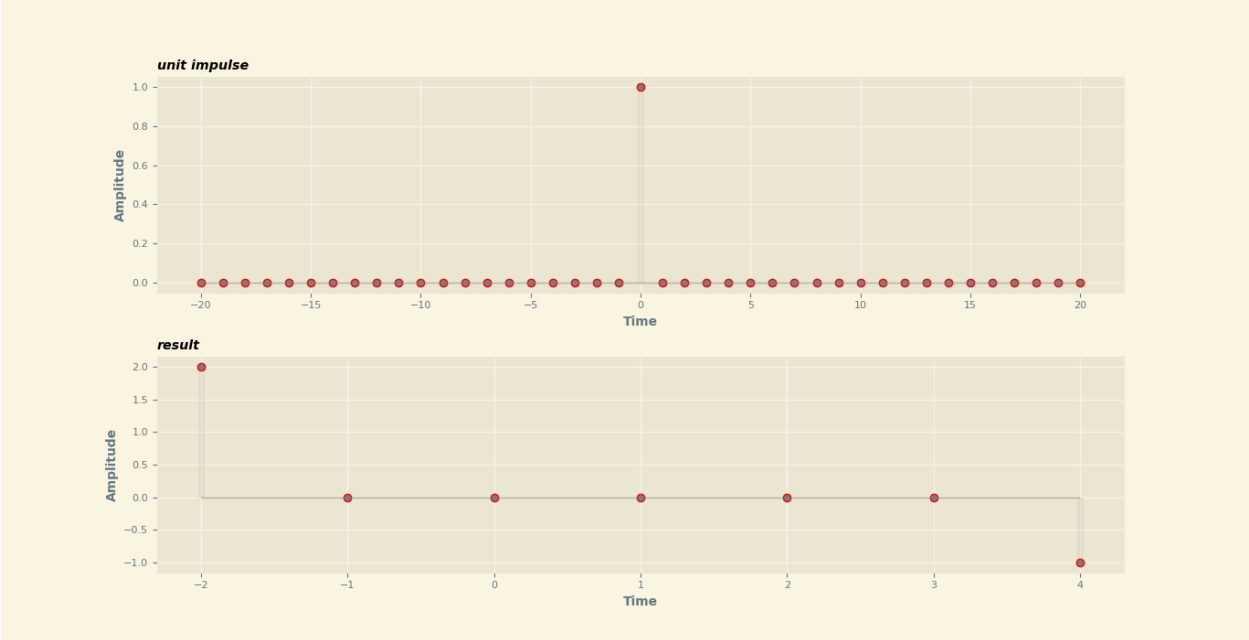
PROGRAM CODE

```
#from wiggles import signals as sp

#generating unit impulse signal
us=sp.unit_impulse()
us.name="unit impulse"
```

```
#performing operation
x=(2*us.TimeShift(2))-us.TimeShift(-4)
x.name="result"

#Trimming and Displaying result
x.trim()
us.compare(x)
```

OUTPUT

Plotted graph



The generated signal and the original signal plotted in the discrete time domain using a user defined function. Represented through a stem graph.

2. USING UNIT STEP

Getting the environment ready

- **Python 3.10** is installed in the system and added to the system variables.
- The library is installed through pip i.e. through the command **“pip install wiggles.”**
- Here, **vs code** is used to code and test out the results.

- The code is written to best find the solution of the given problem and then is evaluated and displayed using the inbuilt **‘show()’** or the **‘compare()’** function in wiggles.

PROBLEM

- Generation of different types of signals, using operations involving **unit step signals.**
- Given,

$$x[n] = n \times [\ u[n] - u[n-10]\ ] + 10 \times e^{-0.3[\ n-10\ ]}[\ u[n-10\ ] - u[n-20]\ ]$$

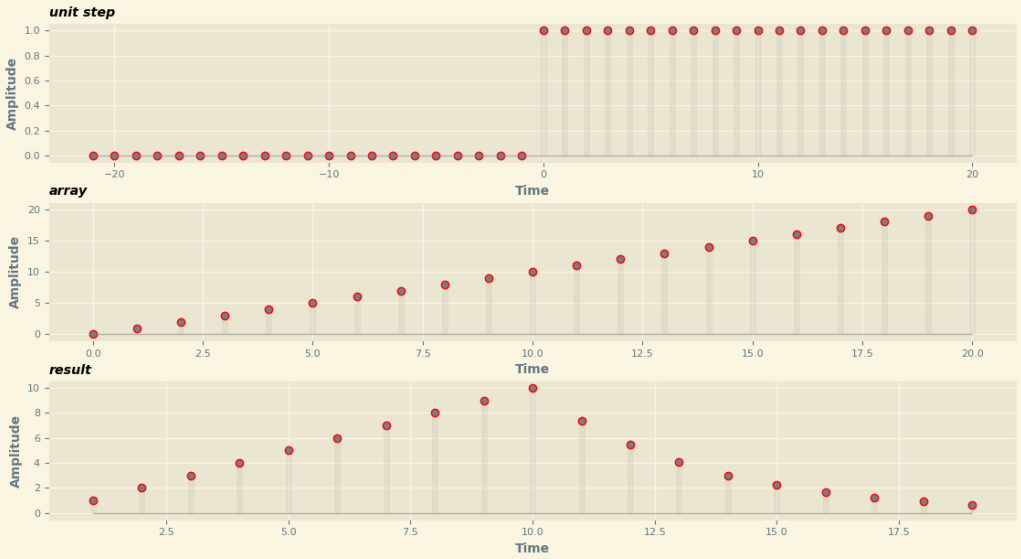
Where, 0 ≤ n ≤ 20

PROGRAM CODE

```
from wiggles import signals as sp
import numpy as np
import math

#generating unit step signal
u=sp.unit_step(21)
u.name="unit step"

#generating array as desired
n=sp.array(np.arange(0,21,1))
n.name="array"

#performing operation
x=(n*(u-u.TimeShift(-10)))+(10*(math.e**(-0.3*(n-10))))*(u.TimeShift(-10)-u.Ti
meShift(-20))
x.trim()
x.name="result"

#Trimming and Displaying result
u.compare(n,x)
```

OUTPUT

Plotted graph



The generated signal and the original signal plotted in the discrete time domain using a user defined function. Represented through a stem graph.

3. USING ANOTHER SIGNAL

Getting the environment ready

- **Python 3.10** is installed in the system and added to the system variables.
- The library is installed through pip i.e. through the command **“pip install wiggles.”**
- Here, **vs code** is used to code and test out the results.
- The code is written to best find the solution of the given problem and then is evaluated and displayed using the inbuilt **‘show()’** or the **‘compare()’** function in wiggles.

PROBLEM

- Generation of different types of signals, using operations involving **unit other signals.**

- Given,

$$x[n] = [\ 1, 2, 3, 4, 5, 6, 7, 6, 5, 4, 3, 2, 1\ ]$$

Starting index = -2

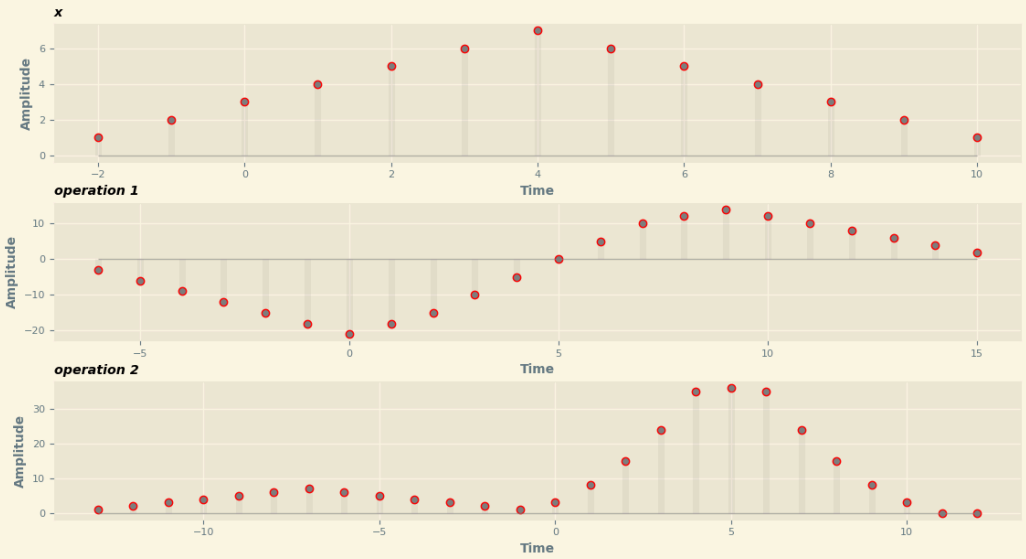
- Determine and plot the following sequences,
  a. $x1[n] = 2 \times x[n - 5] - 3 \times x[\ n + 4]]$
  b. $x2[n] = x[3 - n] + x[\ n\ ] \times x[n - 2]$

PROGRAM CODE

```
from wiggles import signals as sp

#Generating wiggles wave using the given amplitude data
x=sp.discrete([1,2,3,4,5,6,7,6,5,4,3,2,1],-2)
x.name="x"

#Operation 1 (a)
x1=(2*x.TimeShift(-5))-(3*x.TimeShift(4))
x1.name="operation 1"

#Operation 2 (b)
x2=x.operate(-1,3)+(x*x.TimeShift(-2))
x2.name="operation 2"

#Displaying the result
x.compare(x1,x2)
```

OUTPUT

Plotted graph



The generated signal and the original signal plotted in the discrete time domain using a user defined function. Represented through a stem graph.