NATIONAL INSTITUTE OF TECHNOLOGY SURATHKAL

MANGALORE, KARNATAKA-575025

LAB ASSIGNMENT :-01

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ROLL NO :- 211IT017

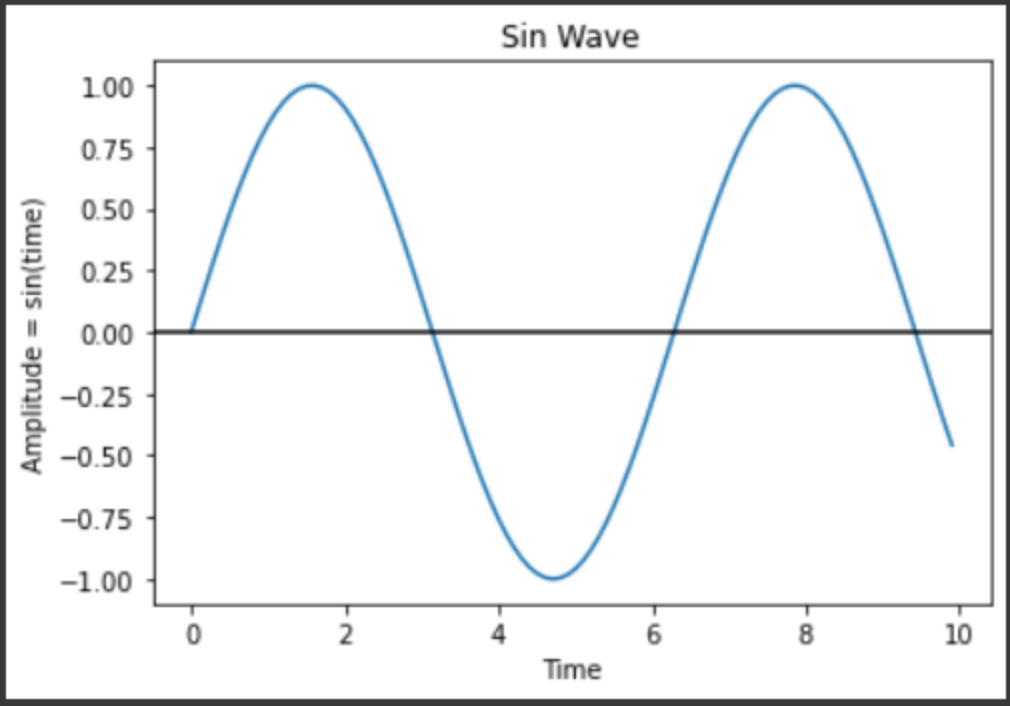
COURSE :- B.TECH (INFORMATION TECHNOLOGY)

SUBJECT :- IT204 (SIGNALS AND SYSTEM LAB)

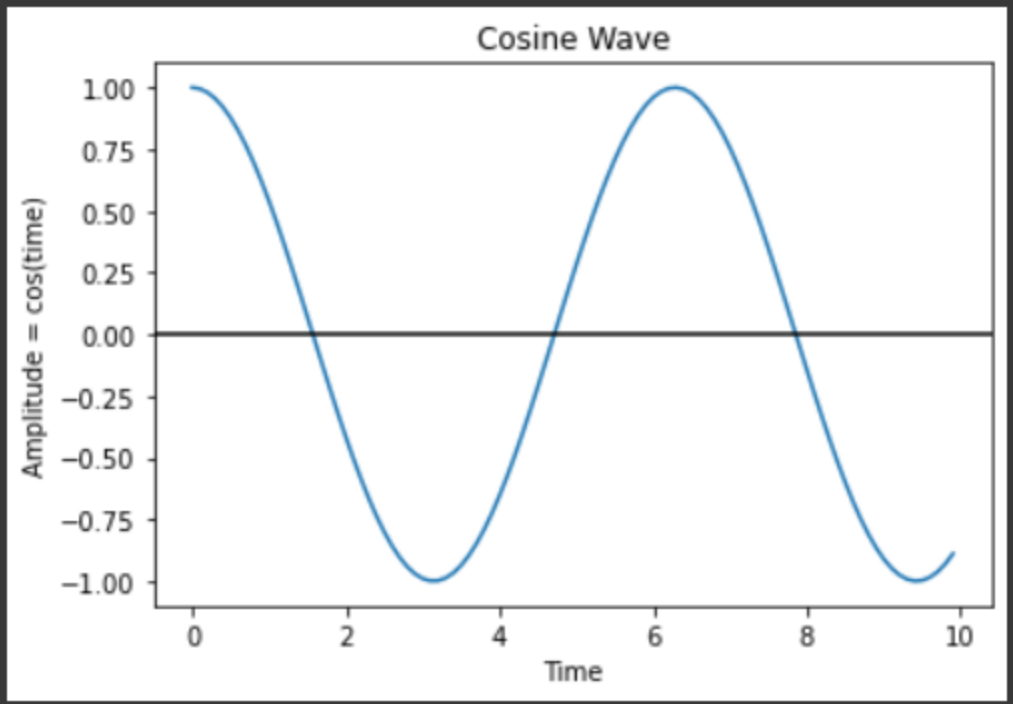
SUBMITTED TO :-

REVANESHA M SIR

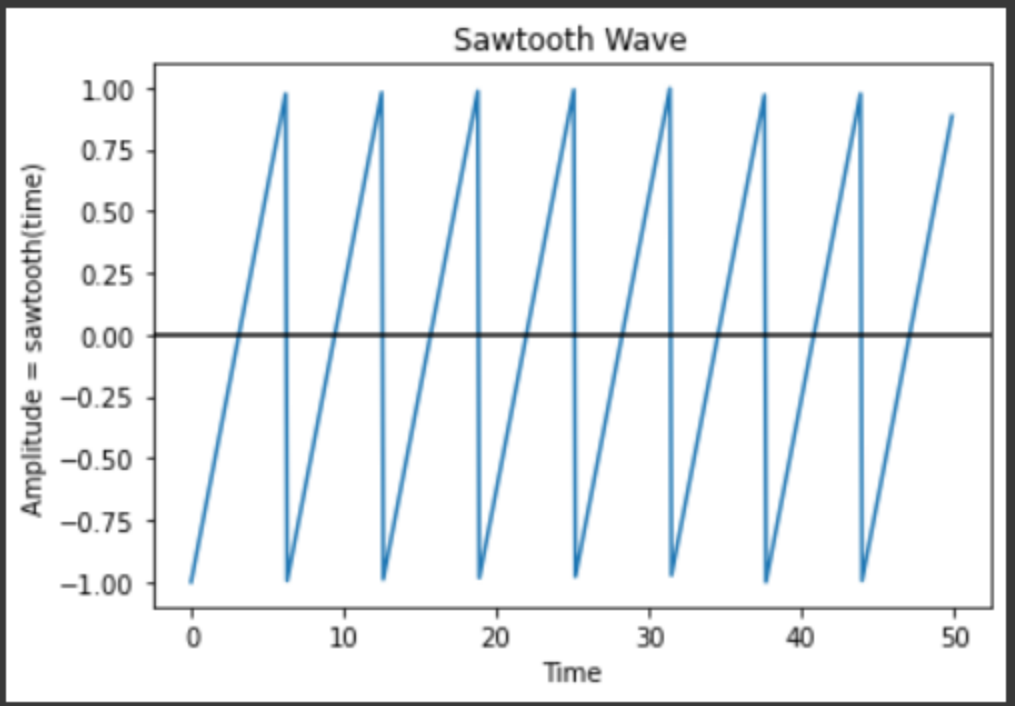
```
[ ]  # Ex. 1) a) sin(T)
     import matplotlib.pyplot as plt
     import numpy as np
     time = np.arange(0,10,0.1);
     amp = np.sin(time)
     plt.plot(time,amp)
     plt.title('Sin Wave')
     plt.xlabel('Time')
     plt.ylabel('Amplitude = sin(time)')
     plt.axhline(y=0,color='k')
     plt.show()
```



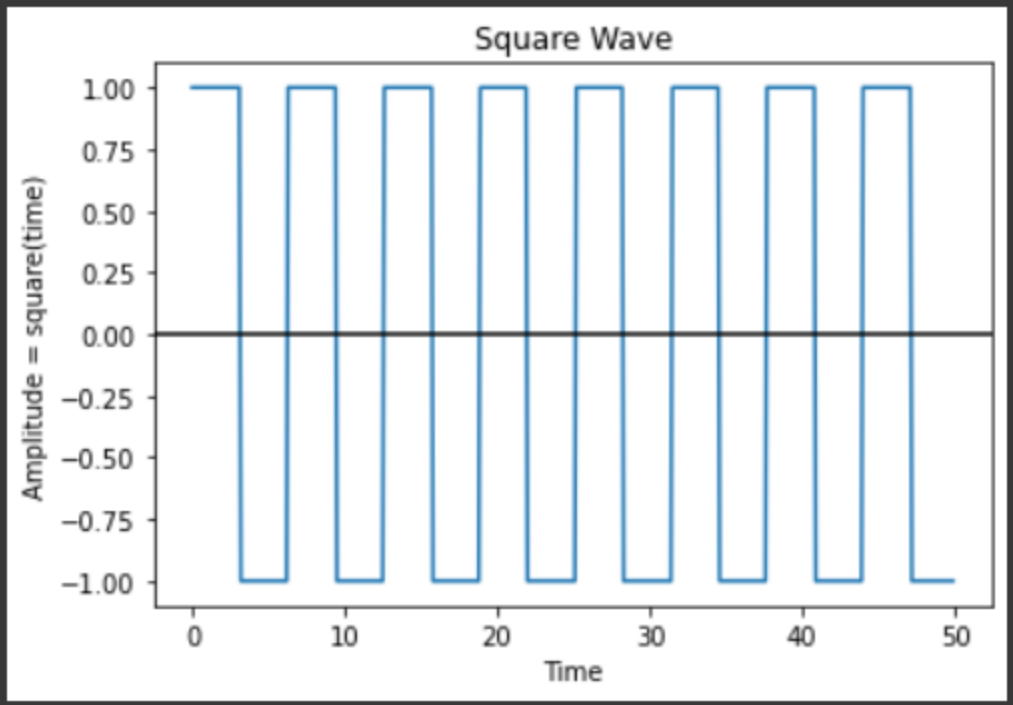
```
[ ]  # Ex. 1) b) cosine(T)
     import matplotlib.pyplot as plt
     import numpy as np
     time = np.arange(0,10,0.1);
     amp = np.cos(time)
     plt.plot(time,amp)
     plt.title('Cosine Wave')
     plt.xlabel('Time')
     plt.ylabel('Amplitude = cos(time)')
     plt.axhline(y=0,color='k')
     plt.show()
```



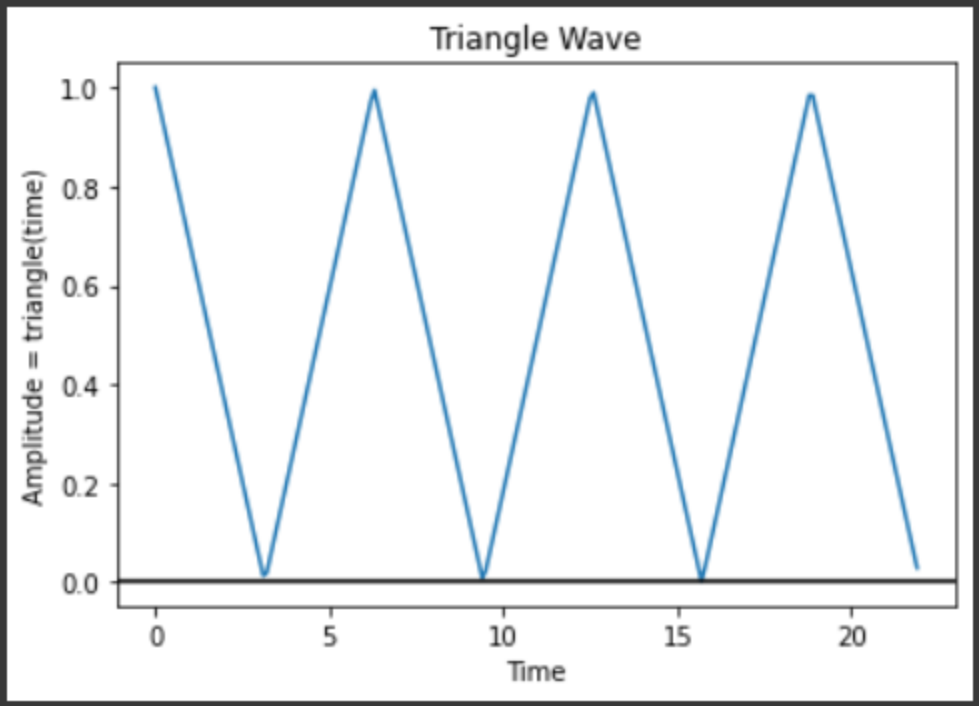
```python
# Ex. 1) c) sawtooth
import matplotlib.pyplot as plt
from scipy import signal
import numpy as np
time = np.arange(0,50,0.1);
amp = signal.sawtooth(time)
plt.plot(time,amp)
plt.title('Sawtooth Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = sawtooth(time)')
plt.axhline(y=0,color='k')
plt.show()
```



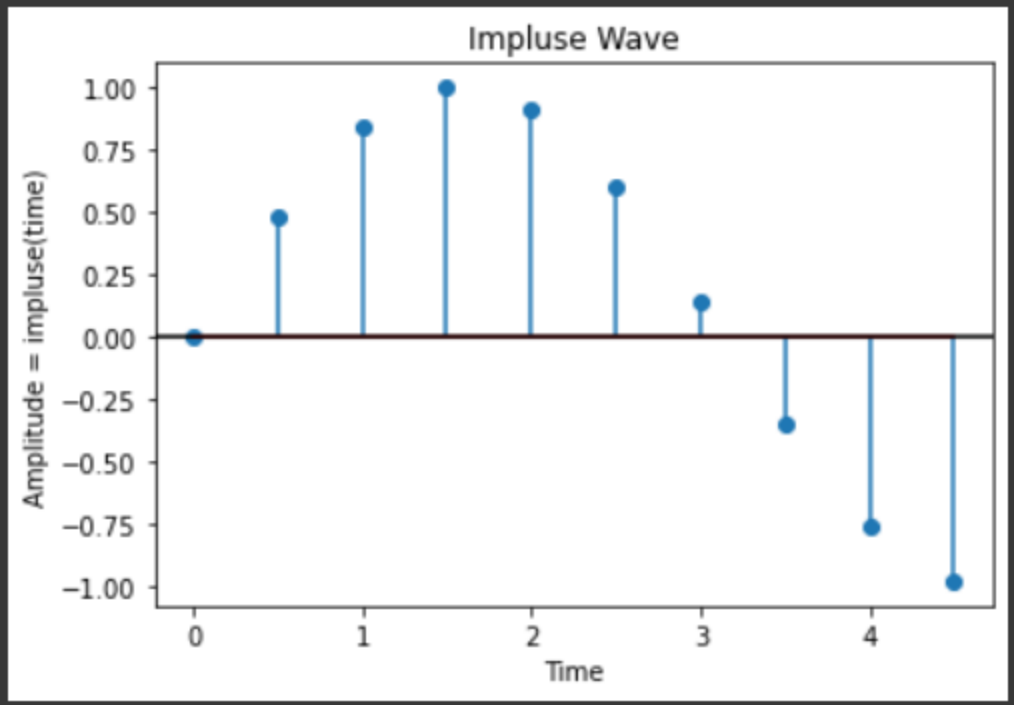
```python
# Ex. 1) d) squarewave
import matplotlib.pyplot as plt
from scipy import signal
import numpy as np
time = np.arange(0,50,0.1);
amp = signal.square(time)
plt.plot(time,amp)
plt.title('Square Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = square(time)')
plt.axhline(y=0,color='k')
plt.show()
```



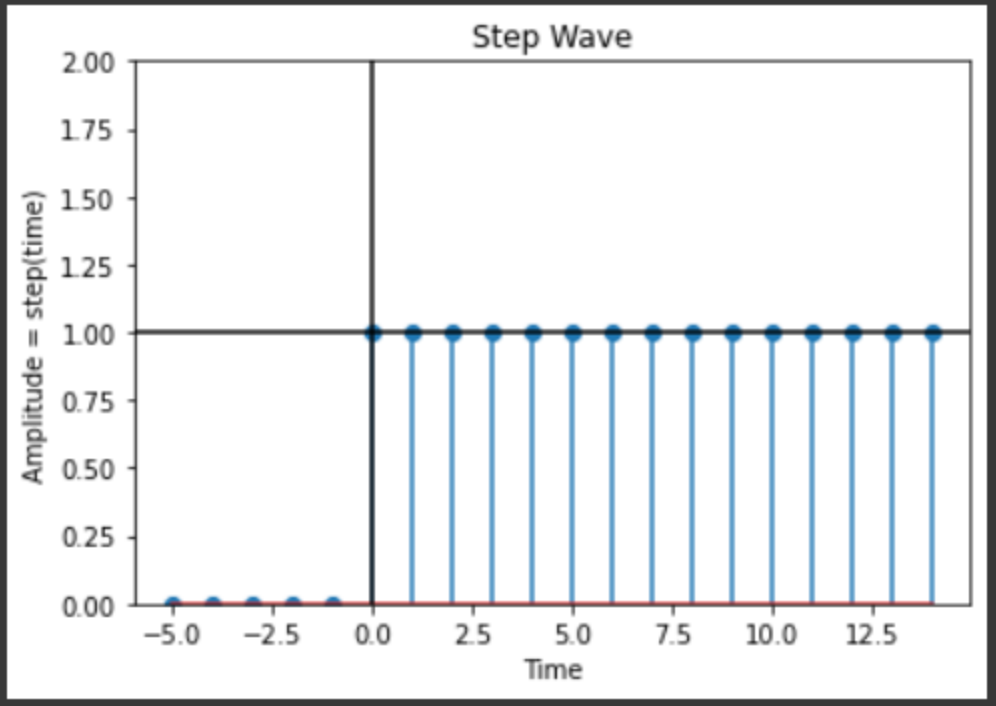
```python
# Ex. 1) e) Triangular
import matplotlib.pyplot as plt
from scipy import signal
import numpy as np
time = np.arange(0,22,0.1);
amp = abs(signal.sawtooth(time))
plt.plot(time,amp)
plt.title('Triangle Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = triangle(time)')
plt.axhline(y=0,color='k')
plt.show()
```



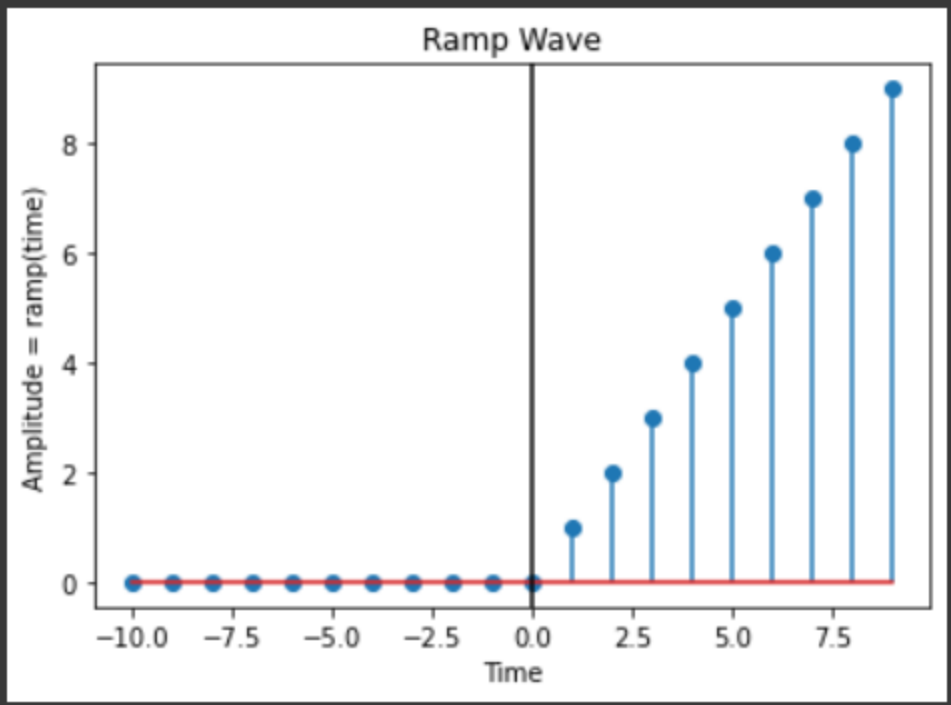
```python
# Ex. 2) a) Impulse
import matplotlib.pyplot as plt
from scipy import signal
import numpy as np
time = np.arange(0,5,0.5);
amp = np.sin(time)
plt.stem(time,amp,use_line_collection=True)
plt.title('Impluse Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = impluse(time)')
plt.axhline(y=0,color='k')
plt.show()
```



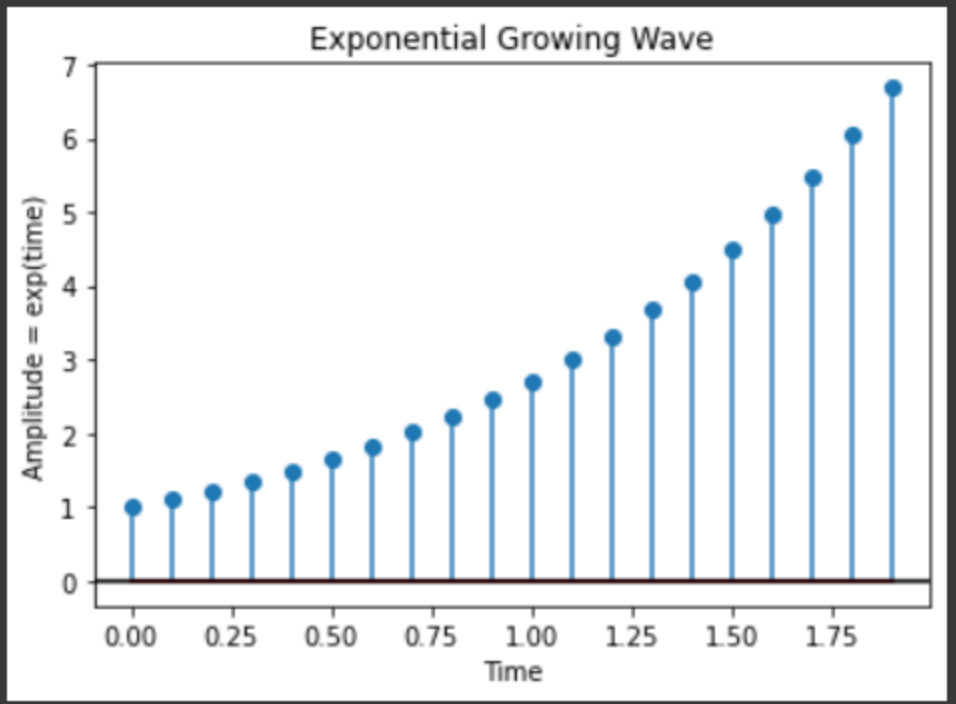
```python
# Ex. 2) b) Step
import matplotlib.pyplot as plt
import numpy as np
time = np.arange(-5,15,1);
amp = np.zeros(np.size(time));
index = np.where(time>=0)
amp[index]=1
plt.stem(time,amp,use_line_collection='true')
plt.title('Step Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = step(time)')
plt.ylim(0,2)
plt.axvline(x=0,color='k')
plt.axhline(y=1,color='k')
plt.show()
```



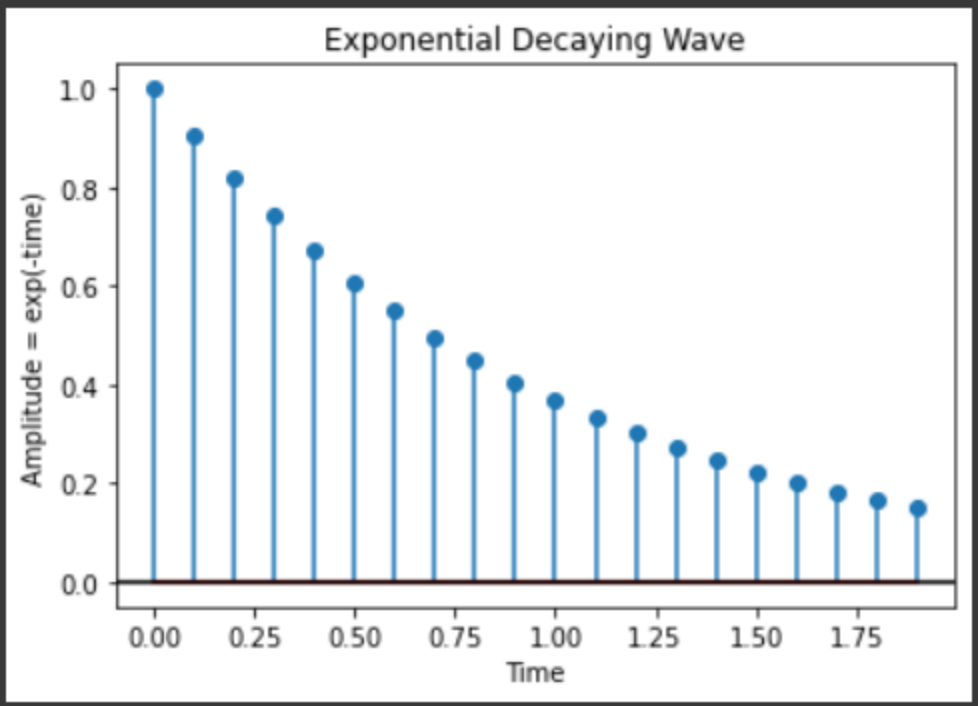
```python
# Ex. 2) c) Ramp
import matplotlib.pyplot as plt
import numpy as np
time = np.arange(-10,10)
ramp = np.zeros(np.size(time))
index = np.where(time>=0)
ramp[index]=time[index]
plt.stem(time,ramp, use_line_collection = 'true' )
plt.title('Ramp Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = ramp(time)')
plt.axvline(x=0,color='k')
plt.show()
```



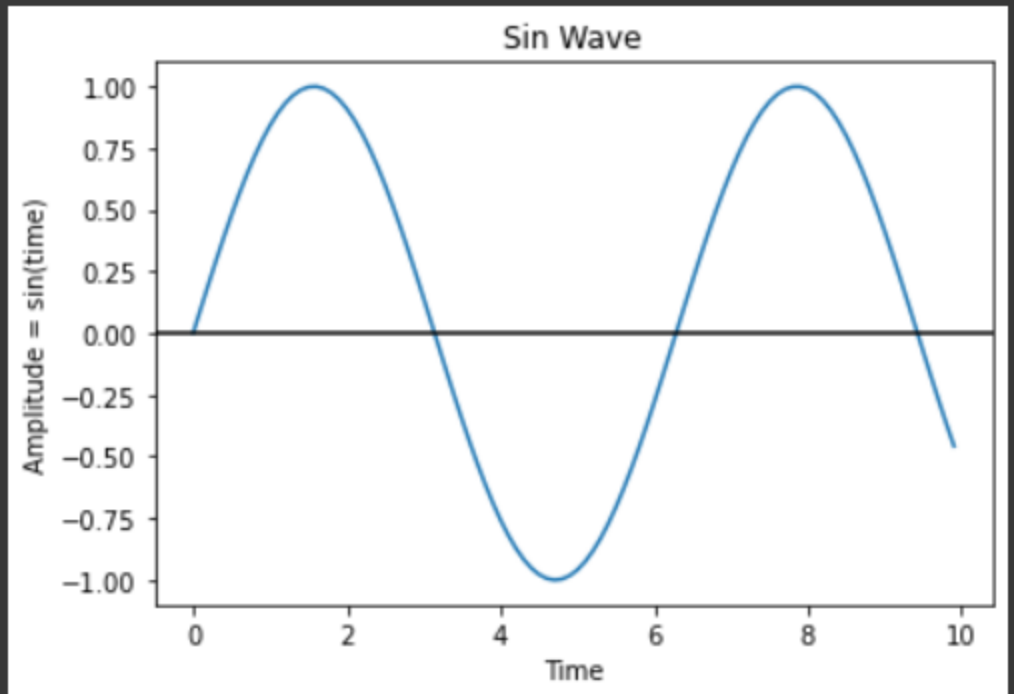
```python
# Ex. 2) d) Exponential Growing
import matplotlib.pyplot as plt
import numpy as np
time = np.arange(0,2,0.1);
amp = np.exp(time)
plt.stem(time,amp,use_line_collection='true')
plt.title('Exponential Growing Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = exp(time)')
plt.axhline(y=0,color='k')
plt.show()
```

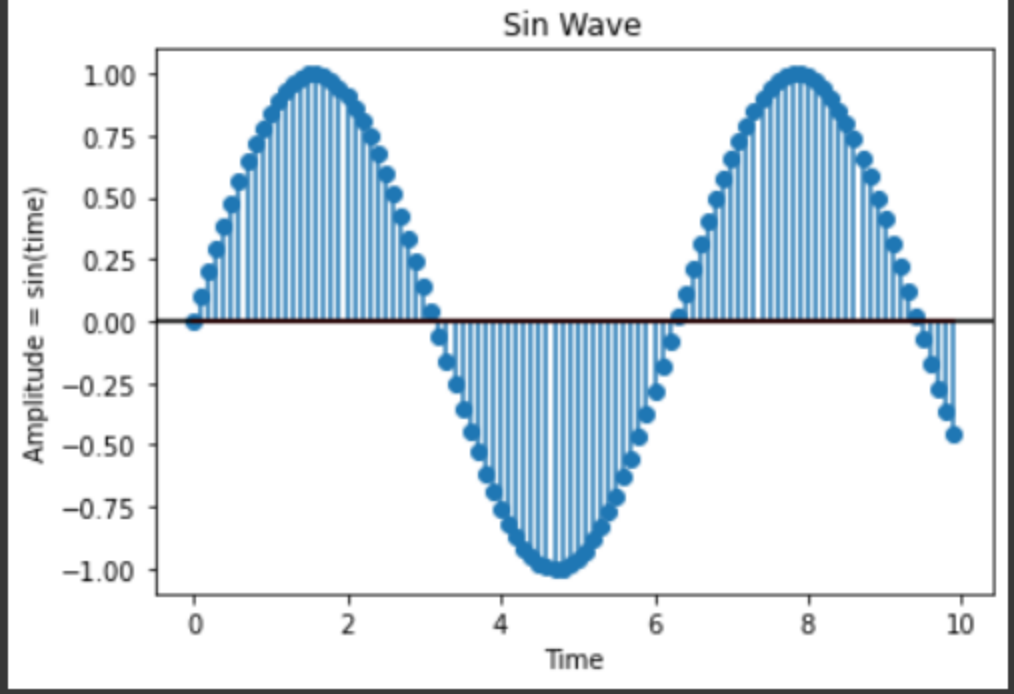


```python
# Ex. 2) e) Exponentially Decaying
import matplotlib.pyplot as plt
import numpy as np
time = np.arange(0,2,0.1);
amp = np.exp(-time)
plt.stem(time,amp,use_line_collection='true')
plt.title('Exponential Decaying Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = exp(-time)')
plt.axhline(y=0,color='k')
plt.show()
```

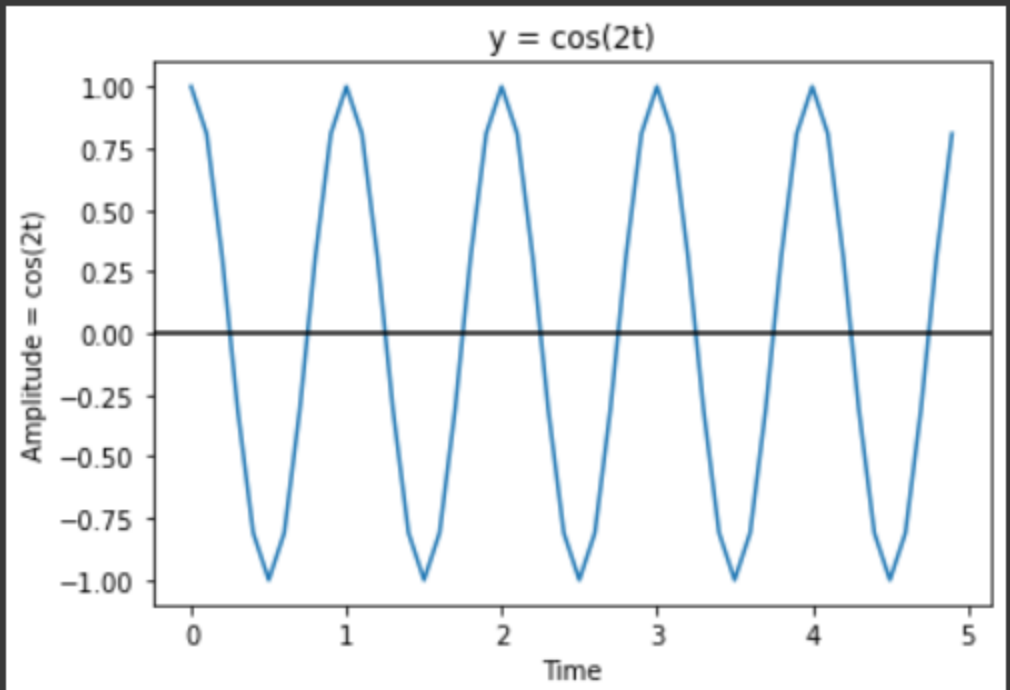


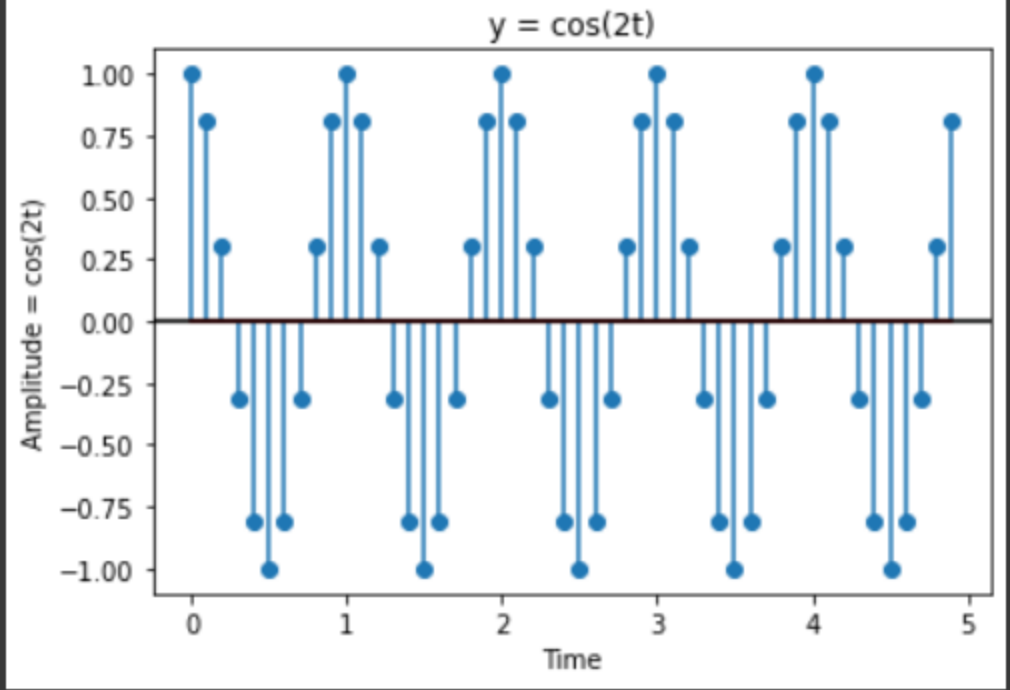
```python
# Ex. 3) a) y = sin(t)
import matplotlib.pyplot as plt
import numpy as np
time = np.arange(0,10,0.1);
amp = np.sin(time)
plt.plot(time,amp)
plt.title('Sin Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = sin(time)')
plt.axhline(y=0,color='k')
plt.show()

plt.stem(time,amp,use_line_collection='true' )
plt.title('Sin Wave')
plt.xlabel('Time')
plt.ylabel('Amplitude = sin(time)')
plt.axhline(y=0,color='k')
plt.show()
```


Sin Wave
Amplitude = sin(time)
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
2
4
6
8
10
Time

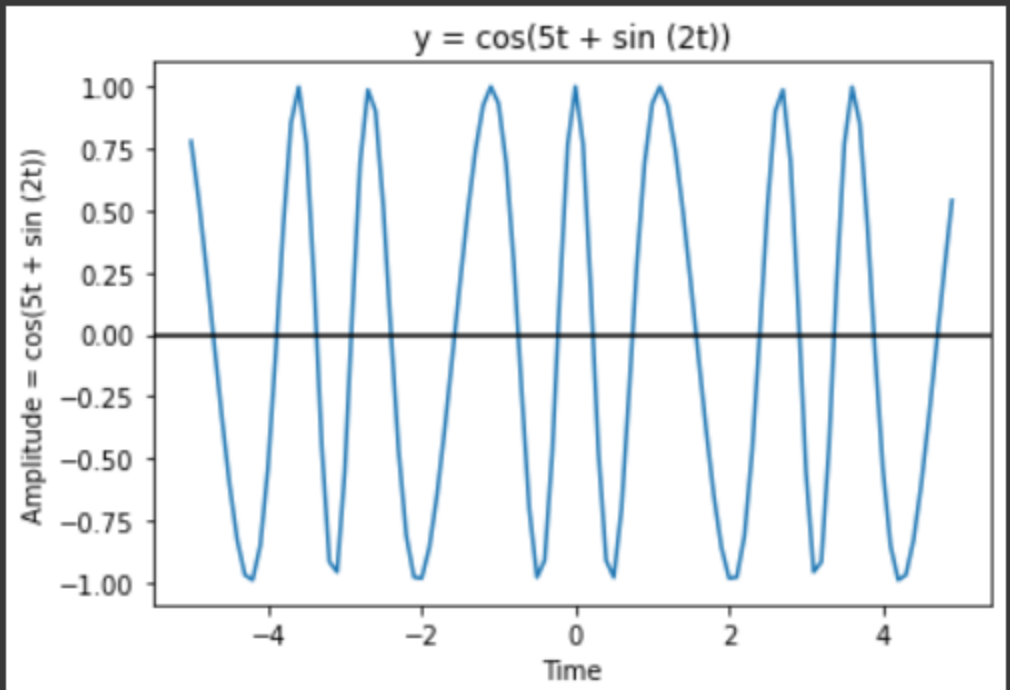

Sin Wave
Amplitude = sin(time)
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
2
4
6
8
10
Time

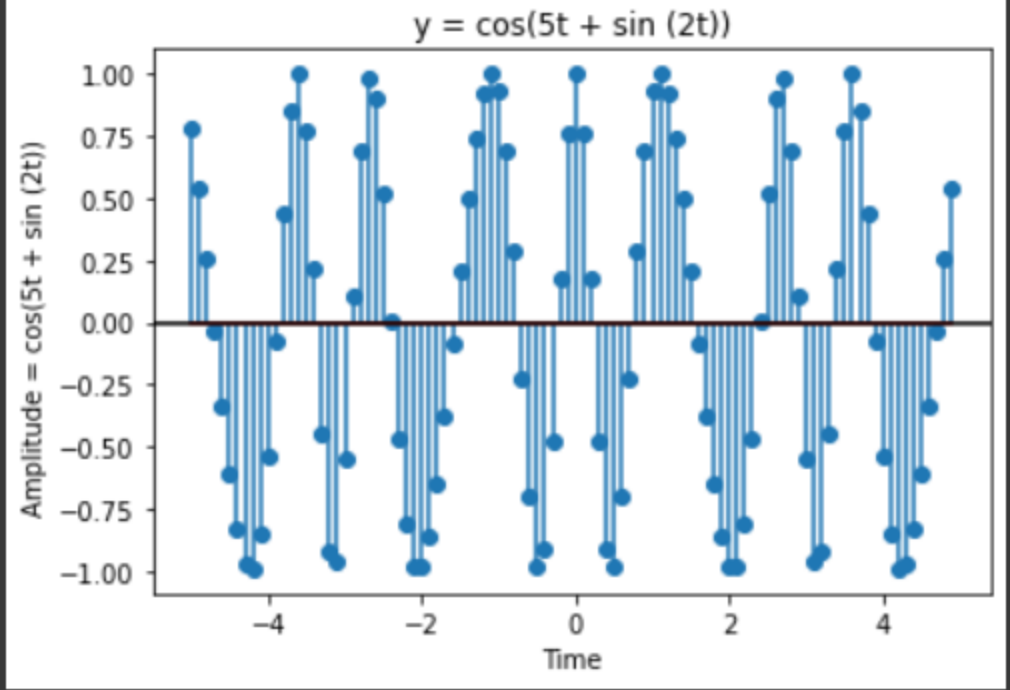
```
# Ex. 3) b) y = cos(2t)
import matplotlib.pyplot as plt
import numpy as np
import math
time = np.arange(0,5,0.1);
amp = np.cos(2*math.pi*time)
plt.plot(time,amp)
plt.title('y = cos(2t)')
plt.xlabel('Time')
plt.ylabel('Amplitude = cos(2t)')
plt.axhline(y=0,color='k')
plt.show()

plt.stem(time,amp,use_line_collection='true' )
plt.title('y = cos(2t)')
plt.xlabel('Time')
plt.ylabel('Amplitude = cos(2t)')
plt.axhline(y=0,color='k')
plt.show()
```


y = cos(2t)
Amplitude = cos(2t)
Time
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
1
2
3
4
5

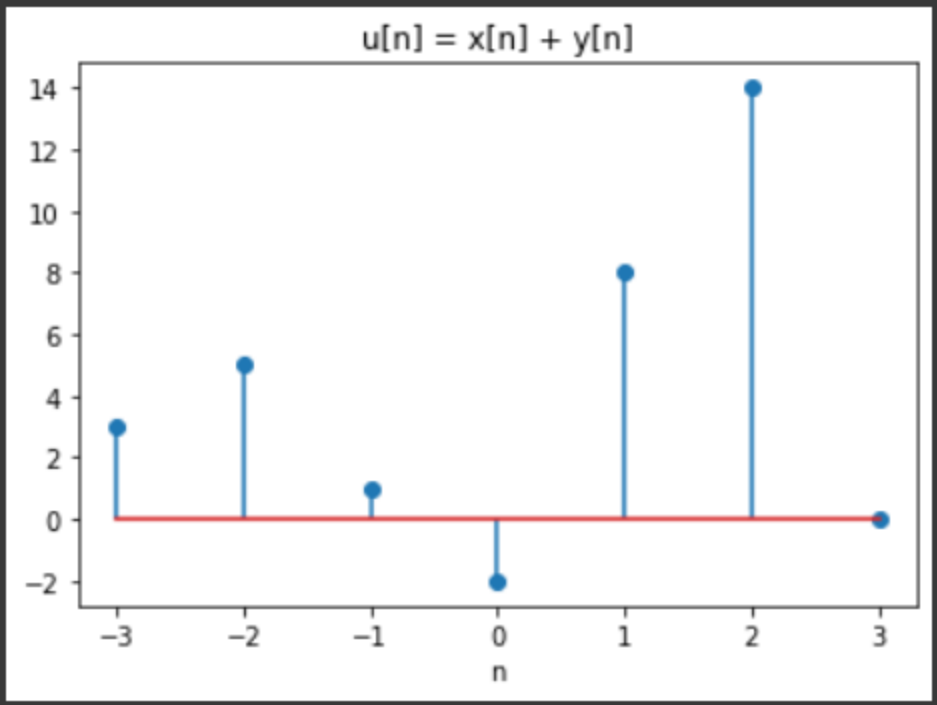

y = cos(2t)
Amplitude = cos(2t)
Time
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
0
1
2
3
4
5

```
# Ex. 3) c) y=cos(5t + sin (2t))
import matplotlib.pyplot as plt
import numpy as np
import math
time = np.arange(-5,5,0.1);
inner = np.sin(2*time) + (5 * time)
amp = np.cos(inner)
plt.plot(time,amp)
plt.title('y = cos(5t + sin (2t))')
plt.xlabel('Time')
plt.ylabel('Amplitude = cos(5t + sin (2t))')
plt.axhline(y=0,color='k')
plt.show()

plt.stem(time,amp,use_line_collection='true' )
plt.title('y = cos(5t + sin (2t))')
plt.xlabel('Time')
plt.ylabel('Amplitude = cos(5t + sin (2t)) ')
plt.axhline(y=0,color='k')
plt.show()
```

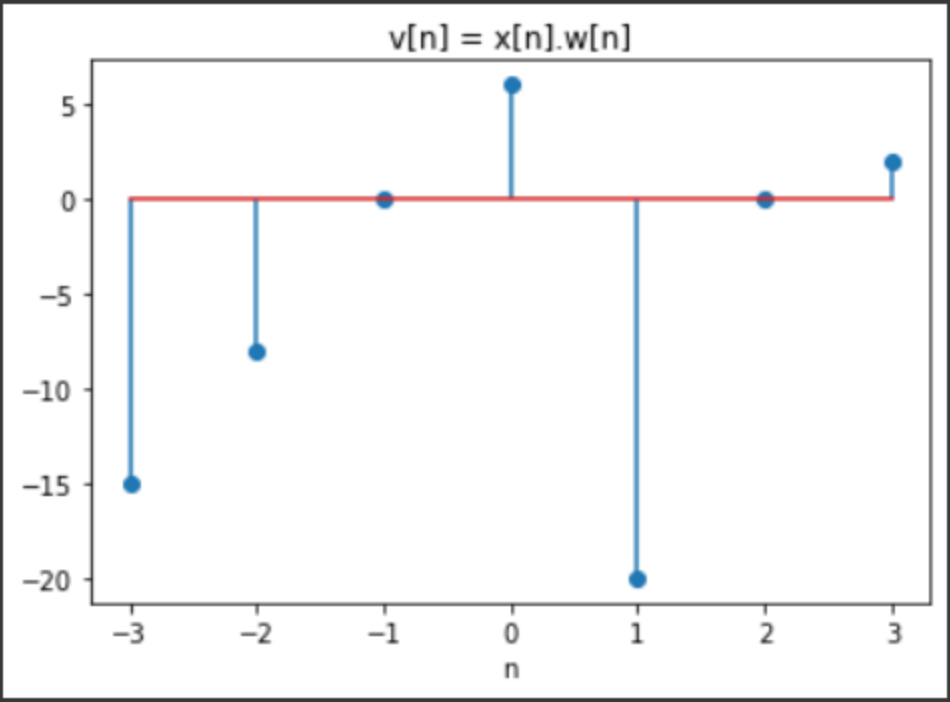

y = cos(5t + sin (2t))
Amplitude = cos(5t + sin (2t))
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
−4
−2
0
2
4
Time


y = cos(5t + sin (2t))
Amplitude = cos(5t + sin (2t))
1.00
0.75
0.50
0.25
0.00
−0.25
−0.50
−0.75
−1.00
−4
−2
0
2
4
Time

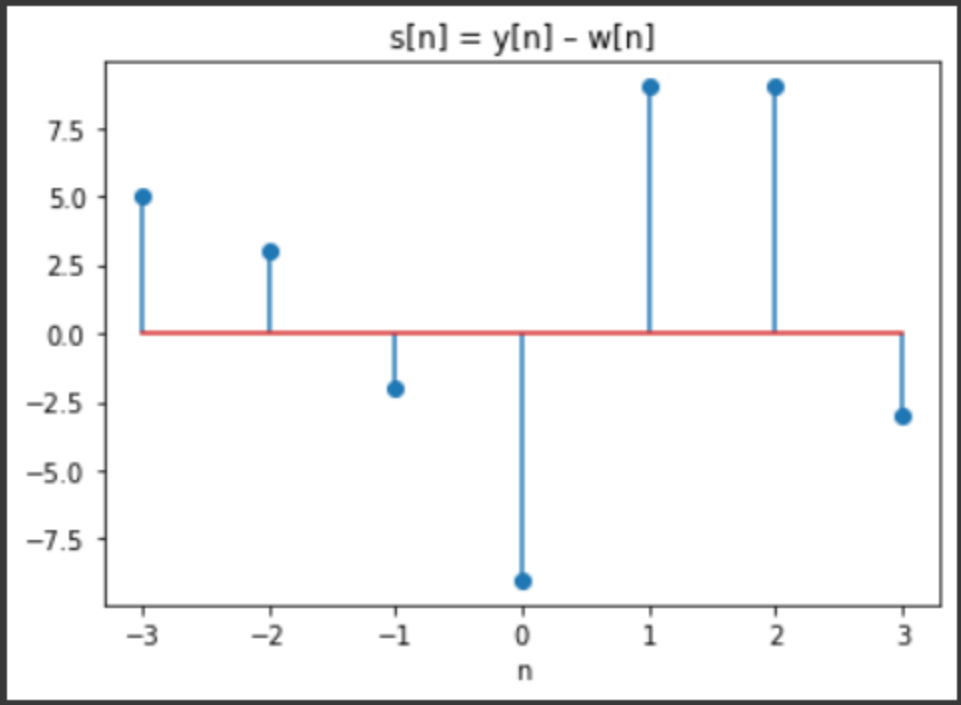
```
[ ]  # Ex. 4) a) u[n] = x[n] + y[n]
     import matplotlib.pyplot as plt
     import numpy as np
     area = np.arange(-3,4,1);
     x = np.array([3,-2,0,1,4,5,2])
     y = np.array([0,7,1,-3,4,9,-2])
     u = np.add(x,y)
     plt.stem(area,u,use_line_collection='true')
     plt.title('u[n] = x[n] + y[n]')
     plt.xlabel('n')
     plt.show()
```



```python
# Ex. 4) b) v[n] = x[n].w[n]
import matplotlib.pyplot as plt
import numpy as np
area = np.arange(-3,4,1);
x = np.array([3,-2,0,1,4,5,2])
w = np.array([-5,4,3,6,-5,0,1])
v = np.multiply(x,w)
plt.stem(area,v,use_line_collection='true')
plt.title('v[n] = x[n].w[n]')
plt.xlabel('n')
plt.show()
```



```
# Ex. 4) c) s[n] = y[n] - w[n]
import matplotlib.pyplot as plt
import numpy as np
area = np.arange(-3,4,1);
y = np.array([0,7,1,-3,4,9,-2])
w = np.array([-5,4,3,6,-5,0,1])
s = np.subtract(y,w)
plt.stem(area,s,use_line_collection='true')
plt.title('s[n] = y[n] - w[n]')
plt.xlabel('n')
plt.show()
```



```python
# Ex. 4) d) r[n] = 4.5y[n]
import matplotlib.pyplot as plt
import numpy as np
area = np.arange(-3,4,1);
y = np.array([0,7,1,-3,4,9,-2])
r = np.multiply(y,4.5)
plt.stem(area,r,use_line_collection='true')
plt.title('r[n] = 4.5y[n] ')
plt.xlabel('n')
plt.show()
```