Question 1

```
# Import NumPy
import numpy as np
# First input array
a = np.array([3, 7])
print("First vector: ", a)
# Second input array
v = np.array([1, 2, 5, 7])
print("Second vector: ", v)
print("Convolution using full mode:")
# Using convolve() function in "full" mode:
print(np.convolve(a, v))
```

```
First vector:  [3 7]
Second vector:  [1 2 5 7]
Convolution using full mode:
[ 3 13 29 56 49]
```

Question 2

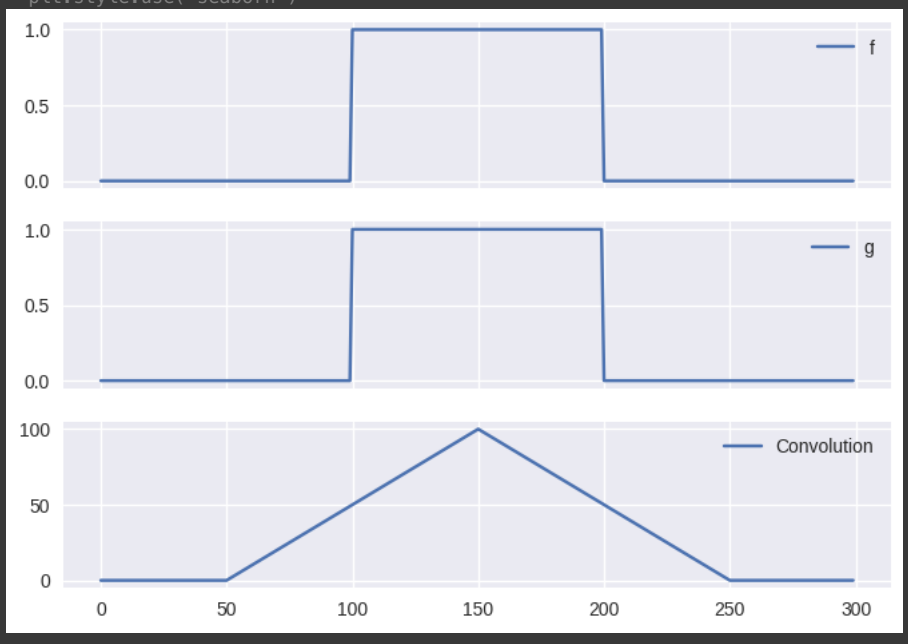
```
# Using convolve() function in "same" mode:
print("Convolution using same mode:")
print(np.convolve(a, v,mode='same'))

# Using convolve() function in "valid" mode:
print("Convolution using valid mode:")
print(np.convolve(a, v,mode='valid'))
```

```
Convolution using same mode:
[ 3 13 29 56]
Convolution using valid mode:
[13 29 56]
```

Question 3

```
import numpy as np
from scipy import signal
import matplotlib.pyplot as plt
plt.style.use('seaborn')
sig1 = np.repeat([0., 1., 0.], 100)
sig2 = np.repeat([0., 1., 0.], 100)
filtered = np.convolve(sig1, sig2, mode='same')
fig, ax = plt.subplots(3,1, sharex=True)
ax[0].plot(sig1, label='f')
ax[1].plot(sig2, label='g')
ax[2].plot(filtered, label = 'Convolution')
for axx in ax: axx.legend()
plt.savefig('convolvesigs.png',bbox_inches='tight', dpi=300)
```

```
<ipython-input-3-0495fe92f4b6>:4: MatplotlibDeprecationWarning: The seaborn styles shipped by Matplotlib are deprecated
  plt.style.use('seaborn')
```



Question 4

```
import numpy as np
from scipy import signal
import matplotlib.pyplot as plt
plt.style.use('seaborn')
N = 100  # 1st signal length
M = 2 * N  # Twice the length of 1st signal
sig1 = np.repeat([0., 1., 0.], 100)
sig2 = np.repeat([0., 1., 0.], M)
conv_result = np.convolve(sig1, sig2, mode='same')
plt.figure(figsize=(10, 6))
fig, ax = plt.subplots(3,1, sharex=True)
ax[0].plot(sig1, label='f')
ax[0].legend()
ax[1].plot(sig2, label='g')
ax[1].legend()
ax[2].plot(filtered, label = 'Convolution')
ax[2].legend()
# for axx in ax: axx.legend()
# plt.savefig('convolvesigs2.png',bbox_inches='tight', dpi=300)
```

```
<ipython-input-4-fe09eaecb33c>:4: MatplotlibDeprecationWarning: The seaborn styles shipped by Matplotlib are deprecated
  plt.style.use('seaborn')
<matplotlib.legend.Legend at 0x7ec4530cba00>
<Figure size 1000x600 with 0 Axes>
```