11-29_RC

November 29, 2021

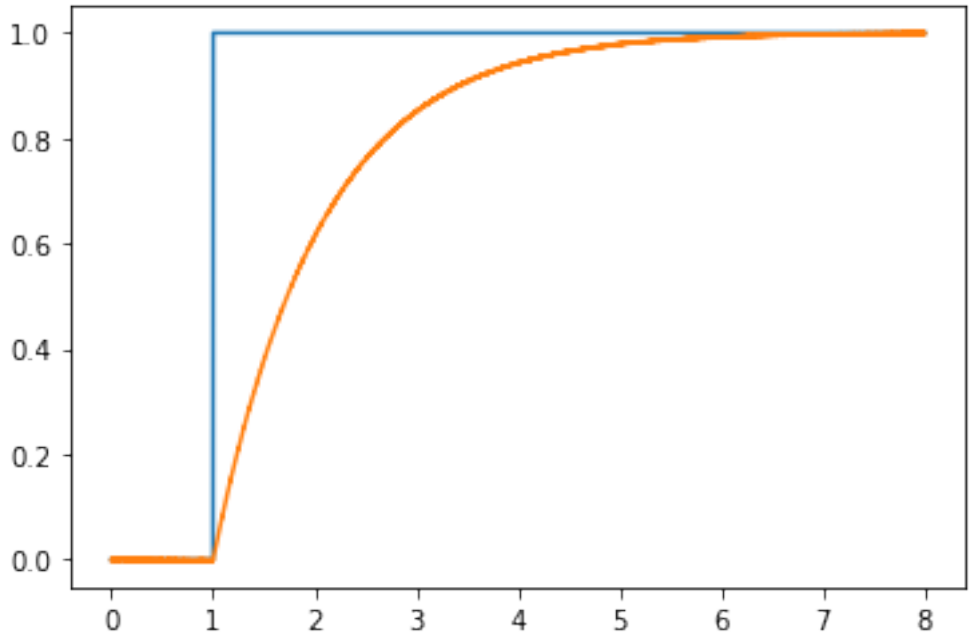
[1]:
```
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
```

[2]:
```
data = np.loadtxt("11-29_RC.csv", delimiter=",", skiprows=1)
```

[3]:
```
t = data[:,0]
Vin = data[:,1]
Vout = data[:,2]
```

[4]:
```
plt.plot(t, Vin)
plt.plot(t, Vout)
```

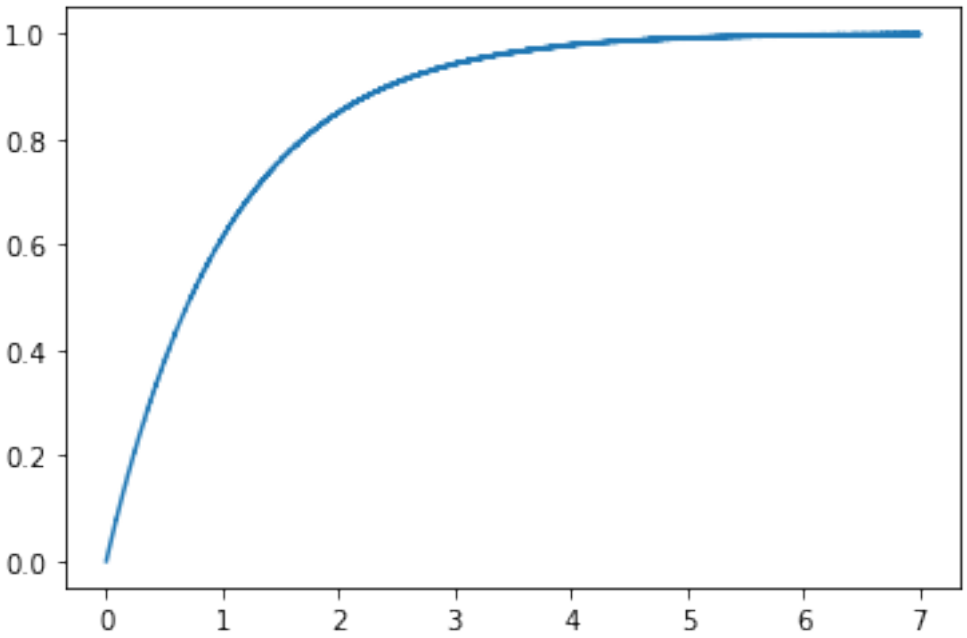
[4]:
```
[<matplotlib.lines.Line2D at 0x7fc7ee0acbe0>]
```



[10]:
```
mask = t > 1
t = t[mask]
t -= t[0]
Vout = Vout[mask]
```

[11]:
```
plt.plot(t, Vout)
```

[11]:
```
[<matplotlib.lines.Line2D at 0x7fc7edf0fb80>]
```

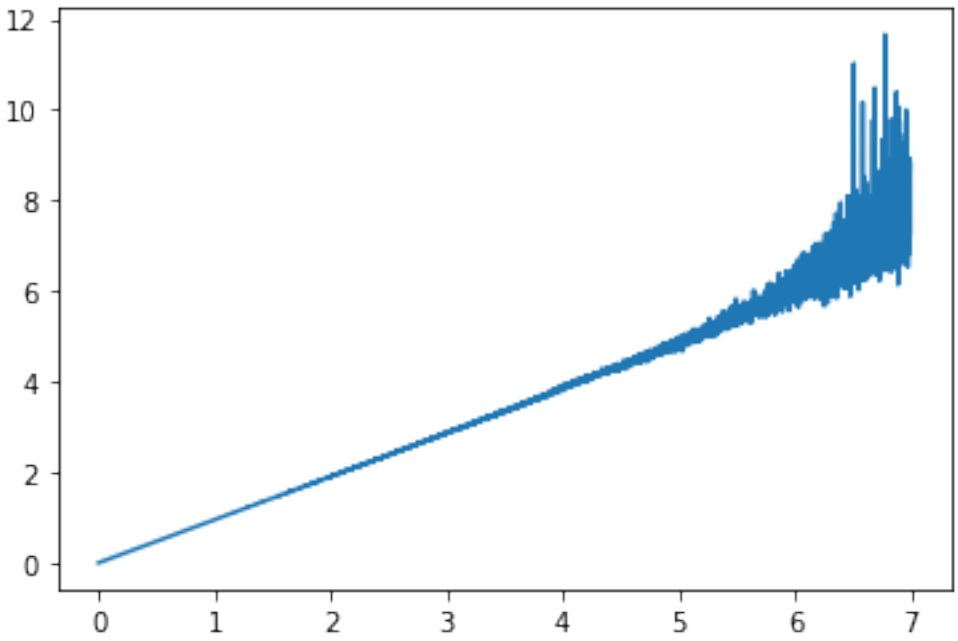


[22]:
```
y = -np.log(1 - Vout)
```

```
/tmp/ipykernel_16623/2161159758.py:1: RuntimeWarning: invalid value encountered
in log
  y = -np.log(1 - Vout)
```

[23]:
```
plt.plot(t, y)
```

[23]:
```
[<matplotlib.lines.Line2D at 0x7fc7edd3fcd0>]
```



[24]:
```
mask = ~np.isnan(y)
y_fix = y[mask]
t_fix = t[mask]
```

[25]:
```
A = t_fix.reshape(-1, 1)
A
```

[25]:
```
array([[0.000e+00],
       [1.000e-03],
       [2.000e-03],
       …,
       [6.994e+00],
       [6.995e+00],
       [6.998e+00]])
```

[26]:
```
x = np.linalg.inv(A.T @ A) @ A.T @ y_fix
x
```

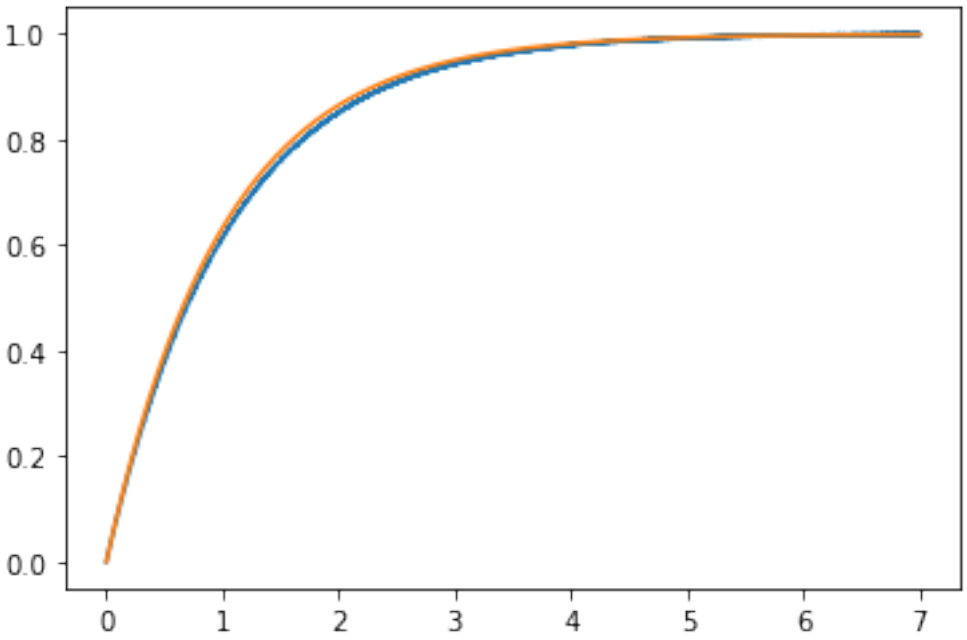
[26]:
```
array([1.00142173])
```

[28]:
```
tau = 1 / x[0]
tau
```

[28]:
```
0.9985802893110796
```

[29]:
```
plt.plot(t, Vout)
plt.plot(t, 1 - np.exp(-t / tau))
```

[29]:
```
[<matplotlib.lines.Line2D at 0x7fc7eded6f70>]
```



[ ]:
```

```