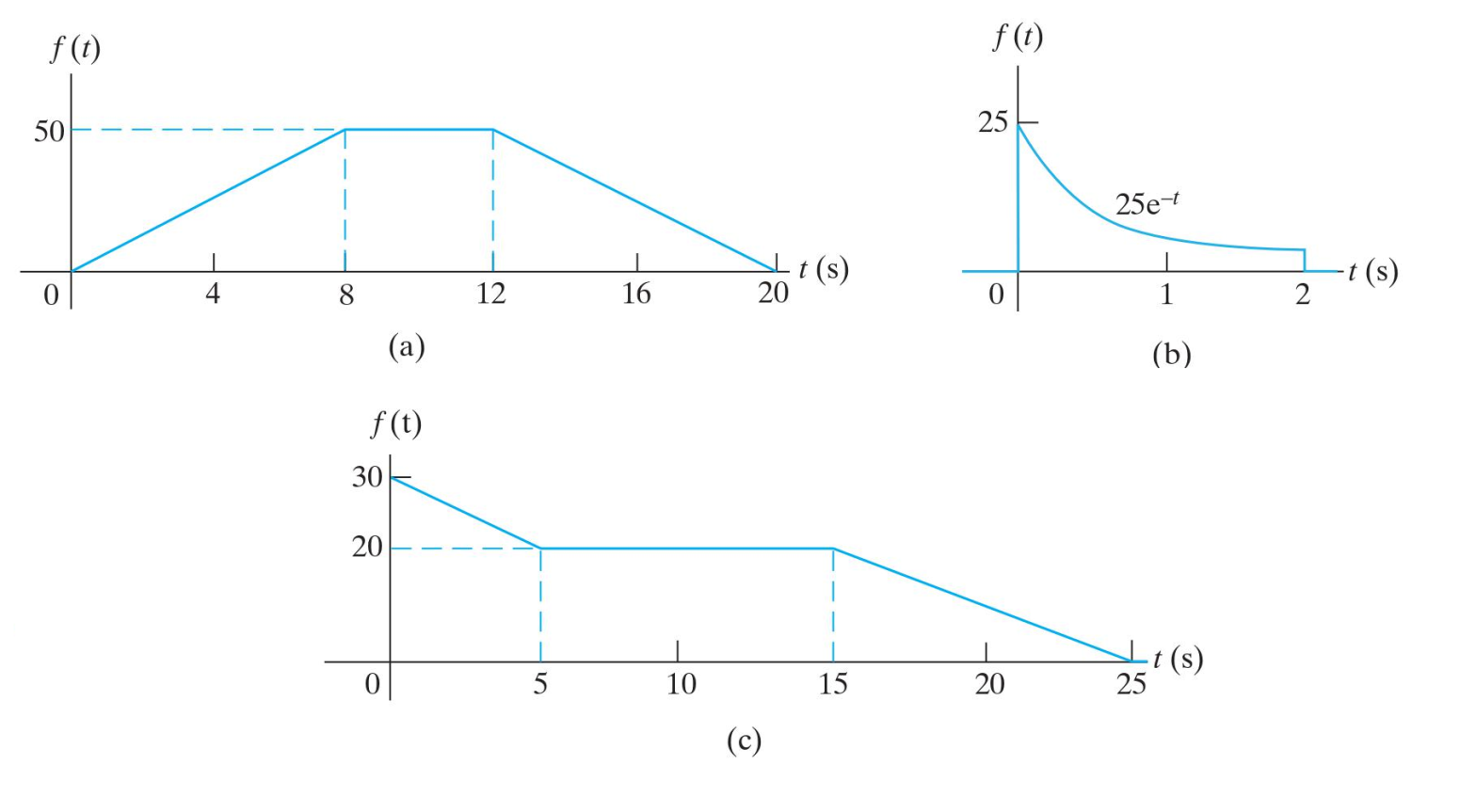
# Laplace transform

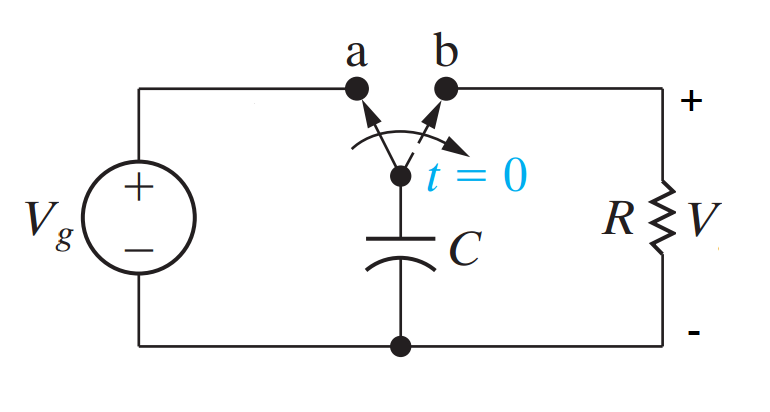
1. Find the Laplace transform of the given function below:



2. Find the inverse Laplace transform of the following function:

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |

# Circuit analysis in S-domain

1. The switch in the circuit in the Fig. 1 has been in the position (a) for a long time. At , the switch moves instantaneously to position (b).

a) Construct and S-domain circuit for .

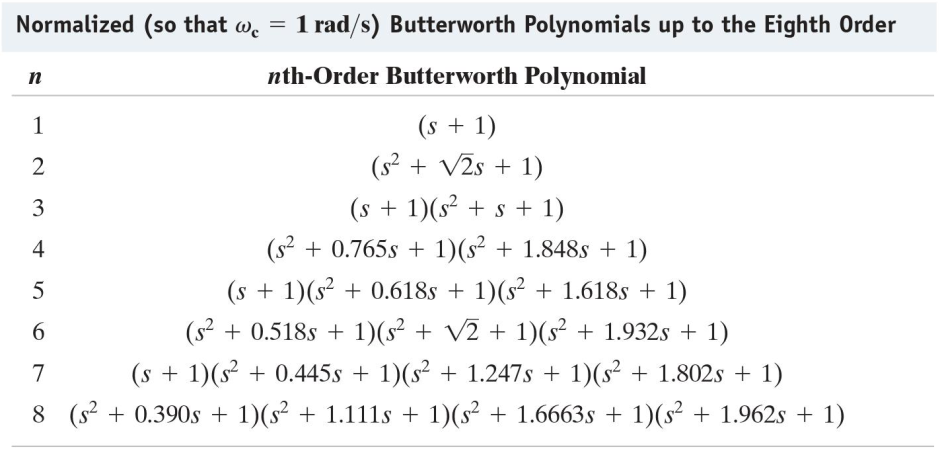
b) Find .

c) Find .

Fig. 1

(You can use: )

# Butterworth filter design

1. Only using resistor, design a circuit that will implement the low pass Butterworth filter in which . Construct the circuit diagram and label all the component values for each following cases:

a) , Gain of 1.

b) , Gain of 3.

c) , Gain of 3.

d), Gain of 3.

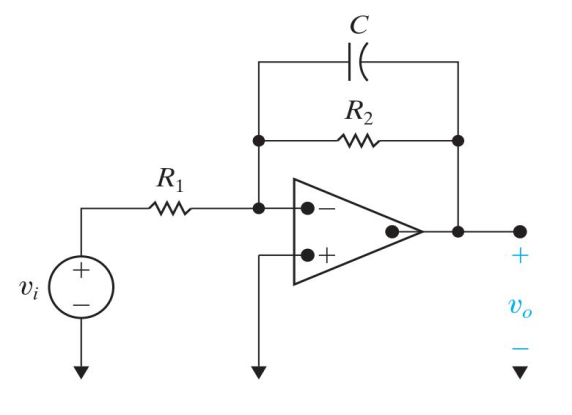
2. Design an Op-amp based HPF with a cut off frequency of 4kHz and pass band gain of 8 using a 250nF capacitor

Fig. 2

a) Label the component value in Fig. 2 .

b) If the value of the feedback resistor is changed but the value of the resistor in forward path is unchanged. What characteristic of the filter is changed.

# Fourier series

1. Find the Fourier series of the function below:

