

ECES 511- Homework 1

Problem 1 The impulse response of an ideal lowpass filter is given by

$$g(t) = 2\omega \frac{\sin 2\omega(t - t_0)}{2\omega(t - t_0)}$$

for all t , where ω and t_0 are constants. Is the ideal lowpass filter causal? Is it possible to build the filter in the real world?

Problem 2 Consider a system whose input and output are related by

$$y(t) = \begin{cases} u^2(t)/u(t-1) & \text{if } u(t-1) \neq 0 \\ 0 & \text{if } u(t-1) = 0 \end{cases}$$

for all t . Show that the system satisfies the homogeneity property but not the additivity property.

Problem 3 Consider a system with impulse response as shown in Fig. 2.20(a). What is the zero-state response excited by the input $u(t)$ shown in Fig. 2.20(b).

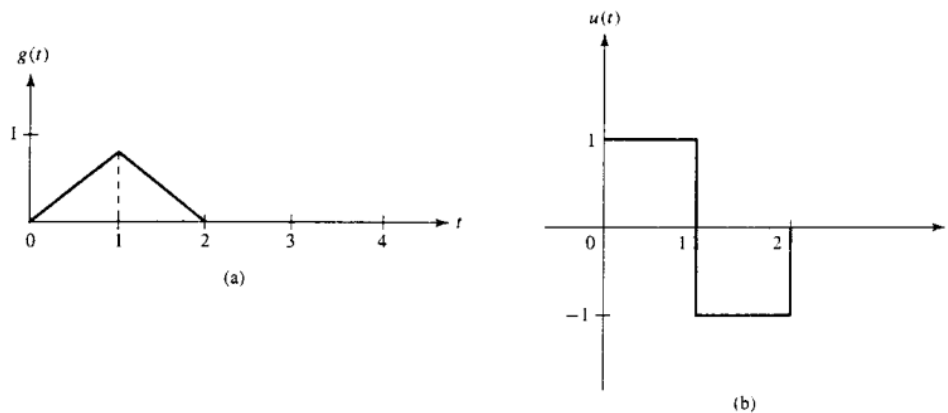


Figure 2.20