EE201 Signals & Systems
Fall 2016-2017

Homework 6
Due 16.11.2016

Question 1. (Problem 2.22 from the textbook)

2.22. For each of the following pairs of waveforms, use the convolution integral to find the response $y(t)$ of the LTI system with impulse response $h(t)$ to the input $x(t)$. Sketch your results.

(a) $\left.\begin{array}{l} x(t) = e^{-\alpha t}u(t) \\ h(t) = e^{-\beta t}u(t) \end{array}\right\}$ (Do this both when $\alpha \neq \beta$ and when $\alpha = \beta$.)

(b) $x(t) = u(t) - 2u(t-2) + u(t-5)$
$\quad\ h(t) = e^{2t}u(1-t)$

(c) $x(t)$ and $h(t)$ are as in Figure P2.22(a).

(d) $x(t)$ and $h(t)$ are as in Figure P2.22(b).

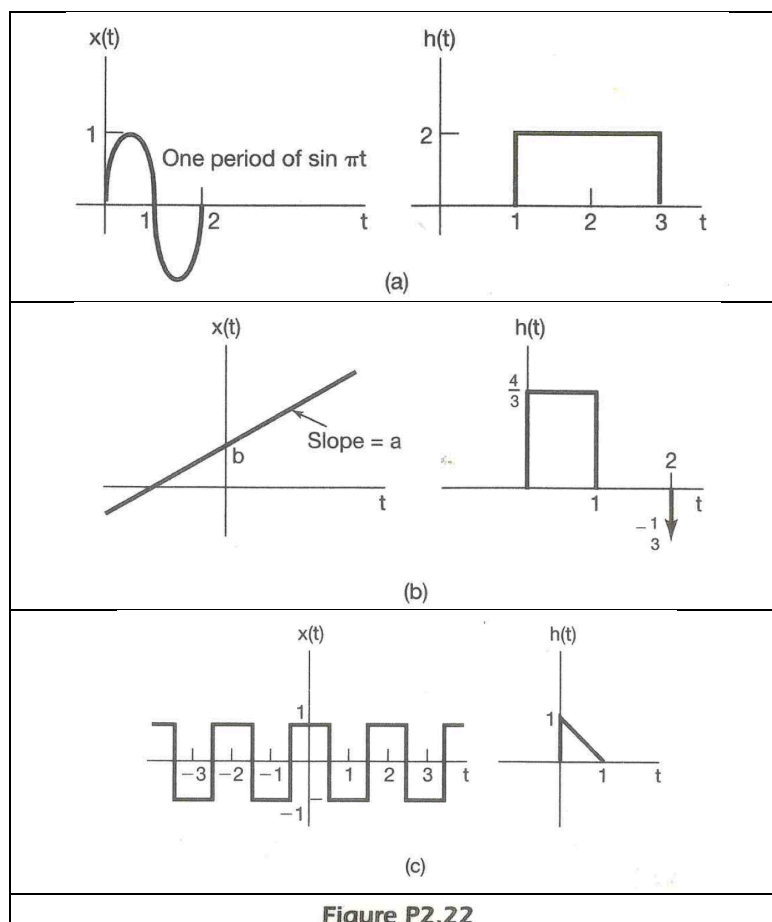(e) $x(t)$ and $h(t)$ are as in Figure P2.22(c).

Figure P2.22

Question 2. (Problem 2.23 from the textbook)

2.23. Let $h(t)$ be the triangular pulse shown in Figure P2.23(a), and let $x(t)$ be the impulse train depicted in Figure P2.23(b). That is,

$$x(t) = \sum_{k=-\infty}^{+\infty} \delta(t - kT).$$

Determine and sketch $y(t) = x(t) * h(t)$ for the following values of T:
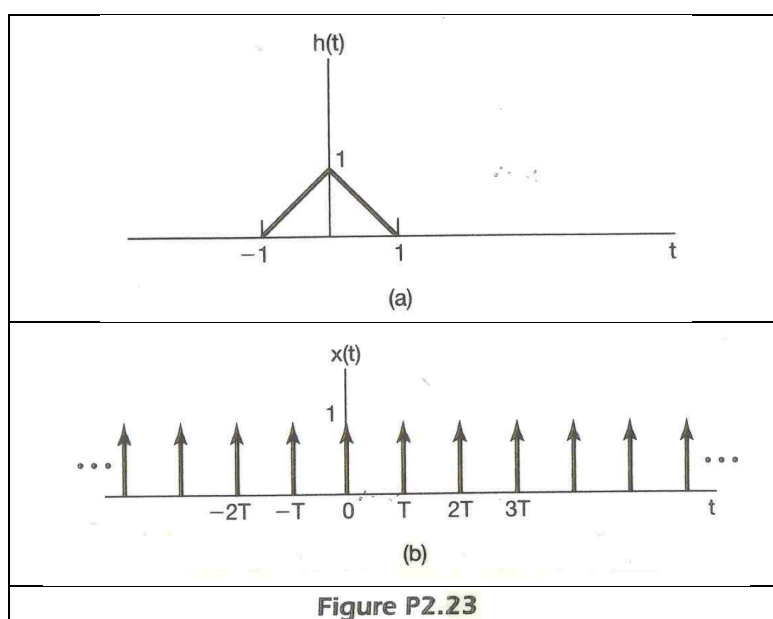(a) $T = 4$ (b) $T = 2$ (c) $T = 3/2$ (d) $T = 1$

(a)

(b)

Figure P2.23

Question 3. (Problem 2.29 from the textbook)

2.29. The following are the impulse responses of continuous-time LTI systems. Determine whether each system is causal and/or stable. Justify your answers.
(a) $h(t) = e^{-4t}u(t - 2)$
(b) $h(t) = e^{-6t}u(3 - t)$
(c) $h(t) = e^{-2t}u(t + 50)$
(d) $h(t) = e^{2t}u(-1 - t)$
(e) $h(t) = e^{-6|t|}$
(f) $h(t) = te^{-t}u(t)$
(g) $h(t) = (2e^{-t} - e^{(t-100)/100})u(t)$