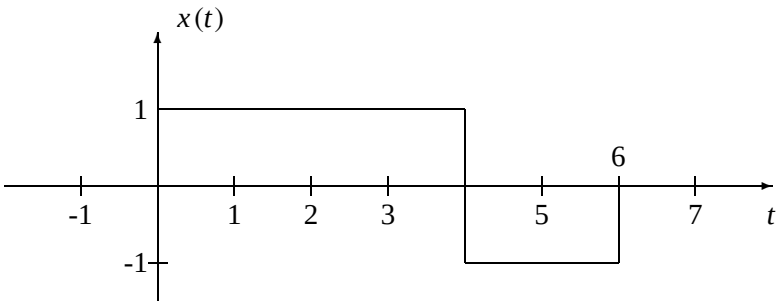
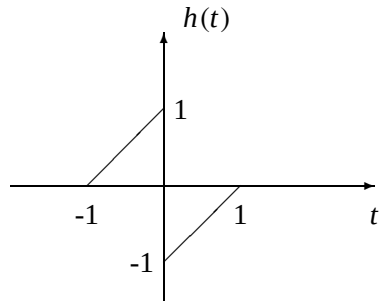
PROBLEM:

If the input $x(t)$ and the impulse response $h(t)$ of an LTI system are the following:



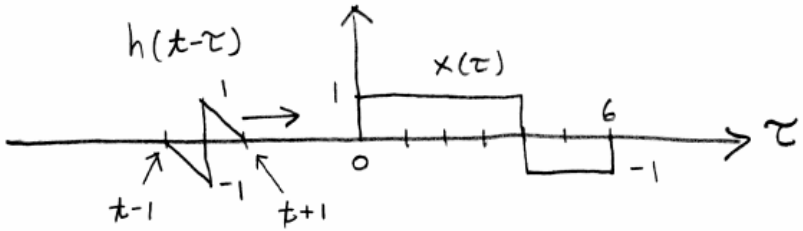


(a) Determine $y(0)$, the value of the output at $t = 0$.

(b) Find all the values of t for which the output $y(t) = 0$. *Note: You do not need to find $y(t)$ at any other values of t.*

McClellan, Schafer and Yoder, *Signal Processing First*, ISBN 0-13-065562-7.
Prentice Hall, Upper Saddle River, NJ 07458.

SOLUTION



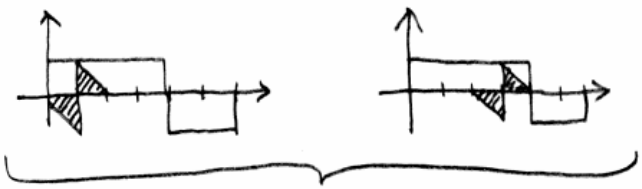
(a)

$t = 0 \Rightarrow$  $y(0) = \frac{1}{2}$ (area of triangle)

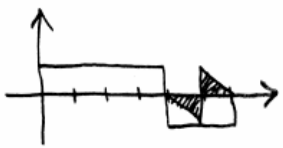
(b)

$y(t) = 0$ if:

1. $t+1 \le 0$
2. $t-1 \ge 6$
3. whenever triangle areas cancel



$t-1 \ge 0$ and $t+1 \le 4$



$t+1 = 6$

$\Rightarrow y(t) = 0$ for all $t \in (-\infty, -1] \cup [1,3] \cup \{5\} \cup [7,\infty)$