1. For each system, determine whether it is (i) Linear, (ii) Time invariant, (iii) causal, (iv) BIBO stable:

(a) $y(t) = \int_{-\infty}^{\infty} [(u(\tau) - u(\tau - 1)] \cdot x(t - \tau) d\tau$

(b) $y(t) = \frac{dx}{dt} + 2$

(c) $y(t) = x(2t)$

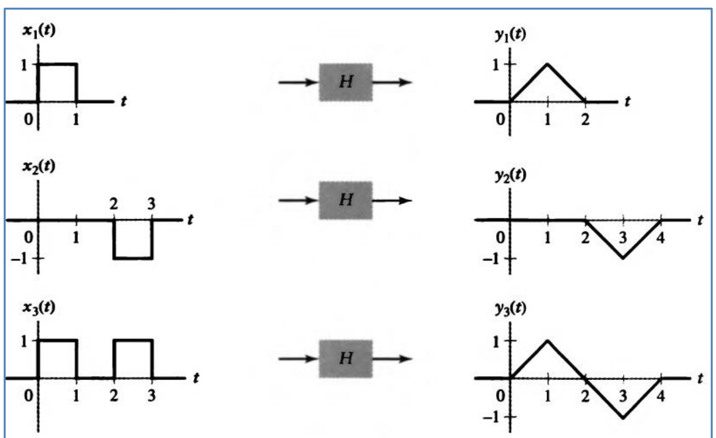
(d) $y(t) = 2\, x(-t + 3)$ u(t)

(e) $y(t) = \int_{-\infty}^{\infty} r(\tau) \cdot x(t - \tau) d\tau$ (recall that r(t) is the ramp signal)

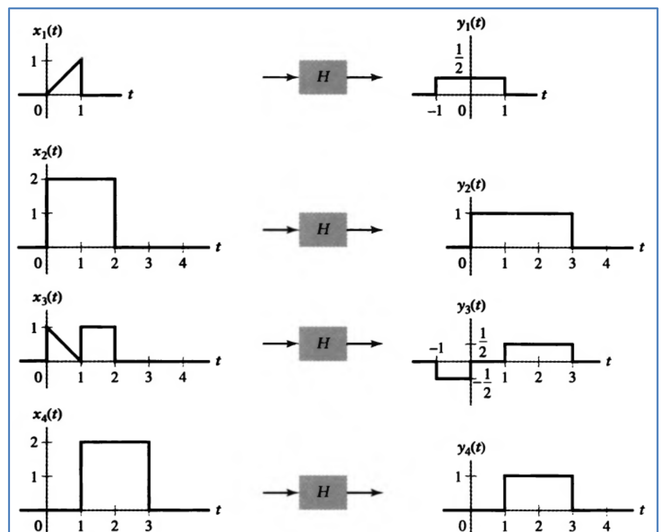
(f) $y(t) = \frac{d^2 x}{dt^2} + 2x$

(g) $y(t) = x(t^2)$

2. A system H has its input-output pairs given. Determine whether the system could be linear, time invariant, and causal for systems (a) and (b) signals shown below. For all cases, justify your answers.

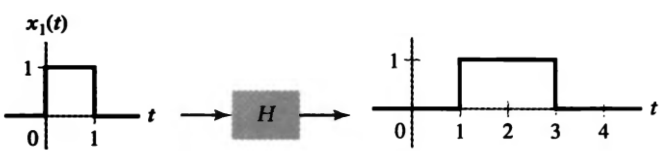


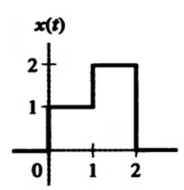
(a)



(b)

3. For a linear time invariant (LTI) system, if the output of the system $y_1(t)$ is known for a particular input $x_1(t)$ as shown below, compute the output of the same system for an input x(t) shown:





- *Assigned*: Thursday June 11, 2015
- *Deadline*: Tuesday June 16, 2015