EEN 340
SIGNALS &
SYSTEMS

TEST 1
50 MINUTES

NDU
ECCE DEPARTMENT

NOTE 1: OPEN BOOK, OPEN NOTES.
NOTE 2: SHOW ALL WORK TO RECEIVE FULL CREDIT

1. 20 pts. A continuous-time signal is shown in Fig. P1. Sketch and label carefully each of the following signals.

a) $-2x(-2t + 5) - 2$
b) $2x(3t + 2)u(t - 2)$

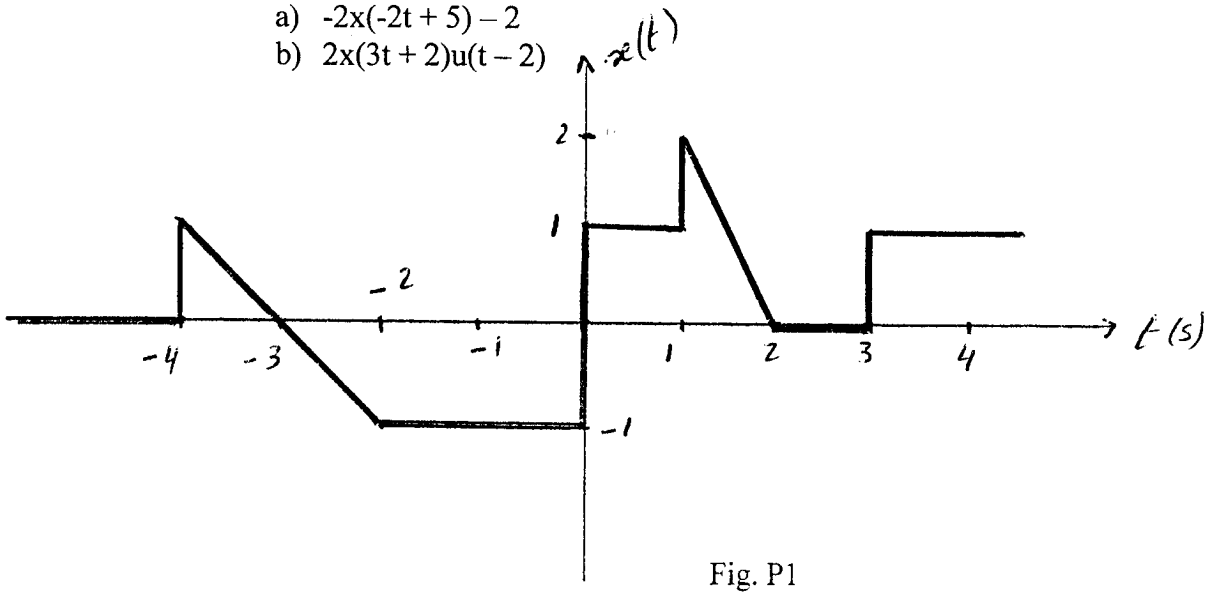

Fig. P1

2. 15 pts. Given the two signals in Fig. P2:

a) Express $x_1[n]$ as a function of $x_2[n]$.
b) Verify your result by checking some points in time.

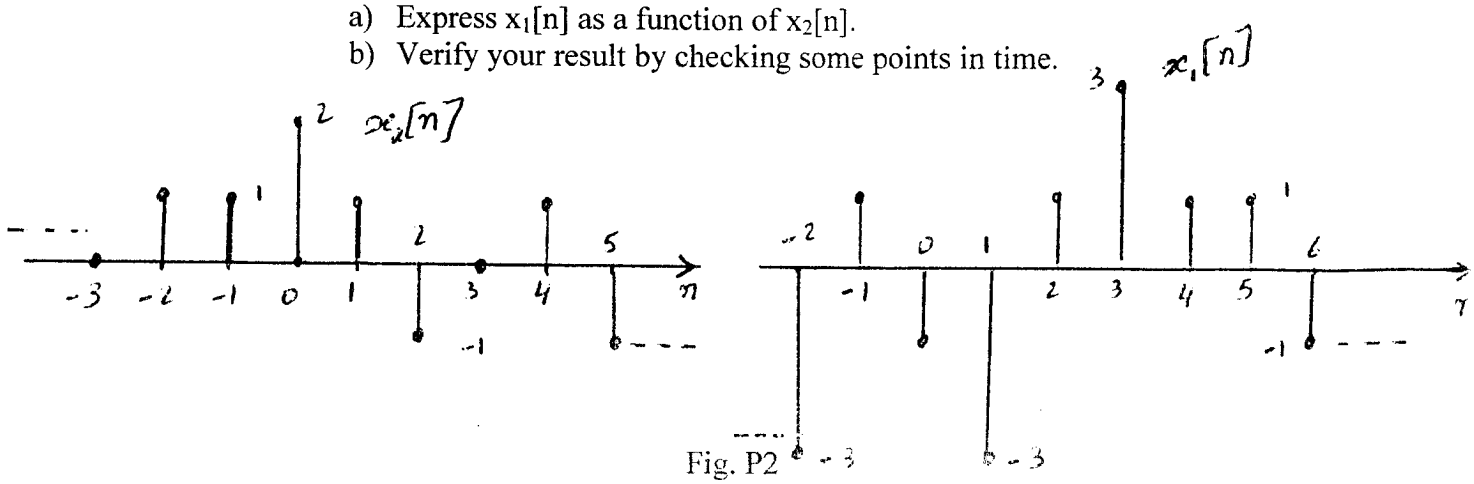

Fig. P2

3. 15 pts. Given in Fig. P3 are the parts of a signal x(t) and its even part $x_e(t)$, for $t \geq 0$ only; that is x(t) and $x_e(t)$ for $t < 0$ are not given. Complete the plots of x(t) and $x_e(t)$, and give a plot of the odd part, $x_o(t)$, of x(t).

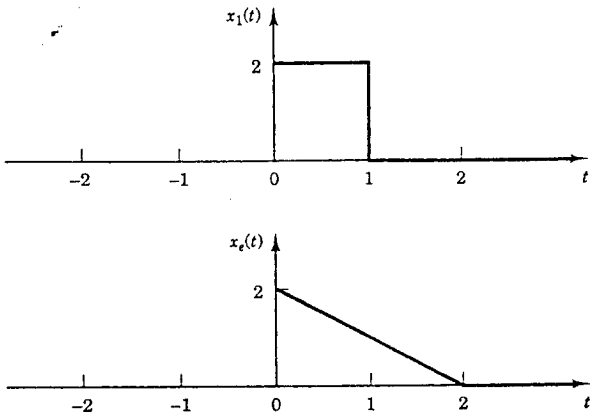

Fig. P3

4. 30 pts. For the LTI system shown in Fig. P4, the input signal is x(t), the output signal is y(t), and the impulse response is h(t). Use the convolution integral to find the output y(t).

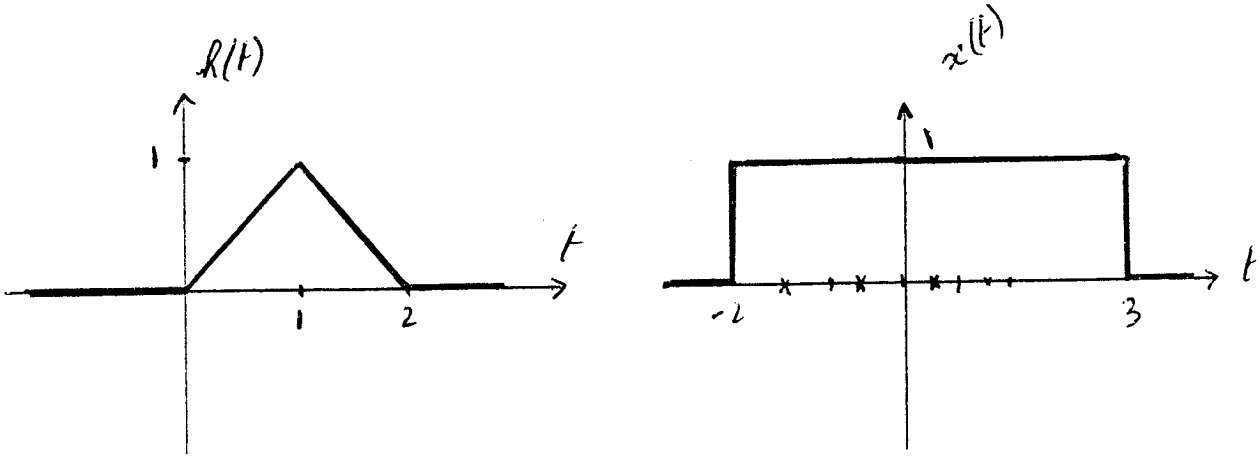

Fig. P4

5. 20 pts. Consider an LTI system with the input and output related by

$$y[n] = 0.5(x[n+1] + x[n])$$

a) Find the system impulse response h[n].
b) Is this system causal? Why?
c) Determine the system response y[n] for the input shown in Fig. P5(a).
d) Consider the interconnections of the LTI systems given in Fig. P5(b), where h[n] is the function found in part (a). Find the impulse response of the total system.

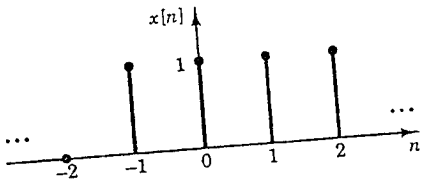

Fig. P5(a)

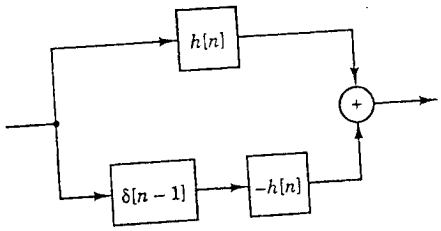

Fig. P5(b)