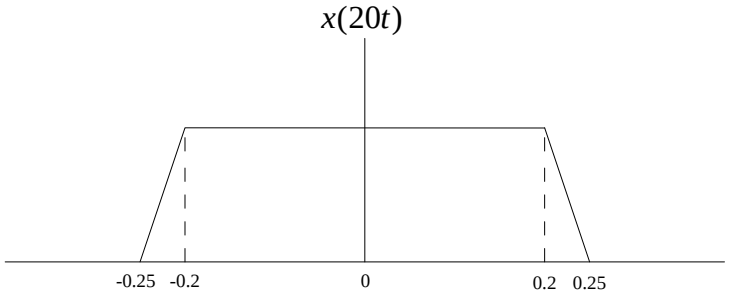
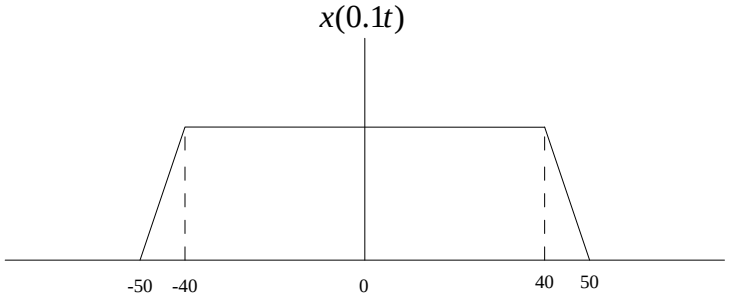
Reference Solutions of Homework # 1

1.

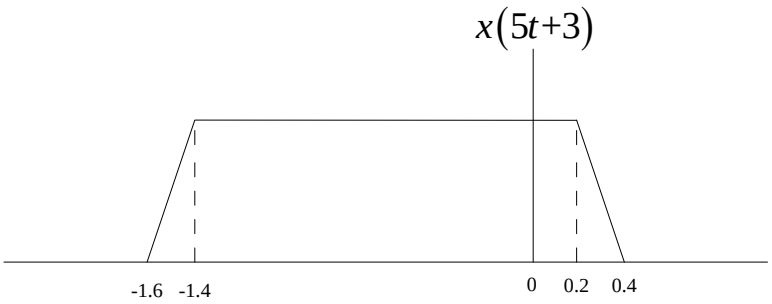
(1) (6%)



(2) (6%)



(3) (8%)



2. (20%)

(1) $x(t)=[\sin(4\pi t)u(t)-\sin(4\pi t)u(-t)]/2.$ => Not periodic.

(2) Not periodic

(3) Periodic

Fundamental period = 8

(4) $x(t)=(1/2)[\cos(3\pi n/4)+\cos(\pi n/4)]$.

Periodic

Fundamental period = 8

(5) Periodic

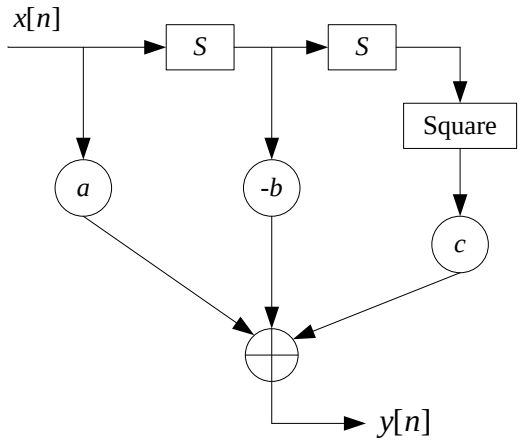
Fundamental period = 16

3. (20%)

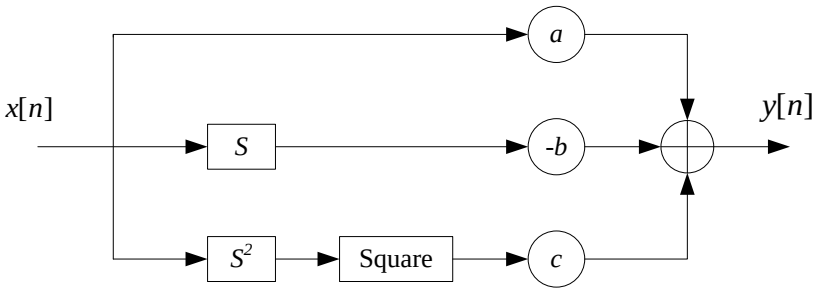
$$y(t) = y_1(t) + y_2(t) - y_4(t)$$
$$= x_1(t)x_1(t-1) + |x_2(t)| - \cos(1+2x_3(t))$$
$$= x(t)x(t-1) + |x(t)| - \cos(1+2x(t))$$

4. $y[n] = ax[n] - bx[n-1] + cx^2[n-2] = (a - bS + cS^2)\{x[n]\}$

(a) (5%) Cascade implementation of operator *H*:



(b) (5%) Parallel implementation of operator *H*:



5.

	Memoryless	invertible	Causal	Stable	Time-invariant	Linear
(1)	○	X	○	X	○	X
(2)	○	X	○	○	○	X
(3)	X	○	X	X	○	○
(4)	X	○	X	○	X	○

The inverse system of sub-problem (3): $x[n] = y[n-2] - y[n-3]$

The inverse system of sub-problem (4): $x(t) = y(2-t)$