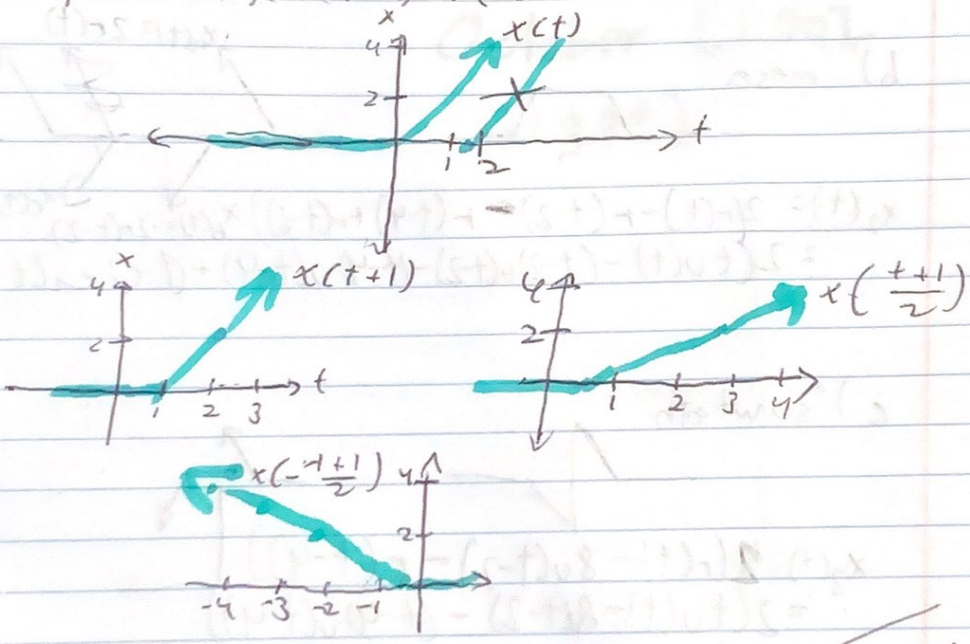
1.2

a) Analog (continuous space) | b) digital (continuous space) | c) digital (discrete space)

1.8

$$x(t) = \begin{cases} 0 & \text{for } t \le 2 \\ (2t-4) & \text{for } t \ge 2 \end{cases}$$

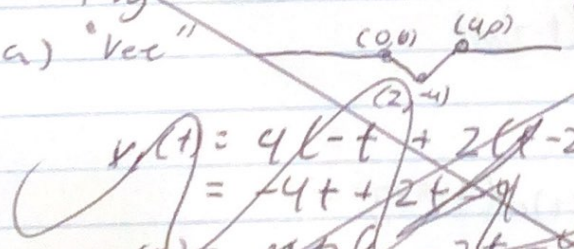
plot $x(t)$, $x(t+1)$, $x\left(\frac{t+1}{2}\right)$, and $x\left(-\frac{t+1}{2}\right)$



1.23 provide expressions for the waveforms described in P1.23 in terms of ramp and step functions.

Fig

a) "Vee"



$x_1(t) = 4(-t + 2(t-2))$

$= -4t + 2t - 4$

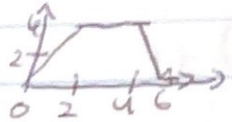
$x_1(t) = -2t - 4$

$x_1(t) = 4(2x_b(t) + x_a(t))$

$= 8r(t-2) - 4r(t)$

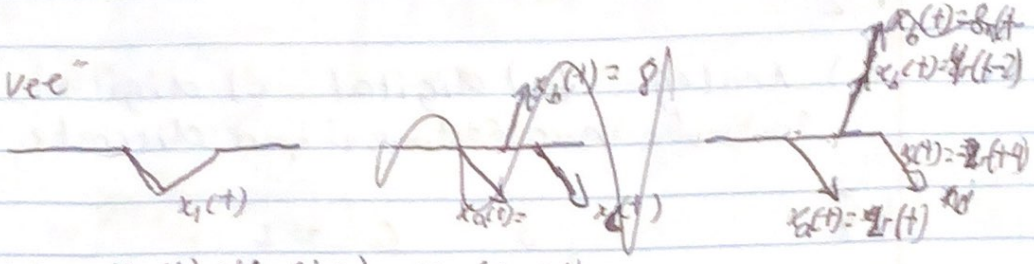
$= 8((t-2)u(t-2)) - 4(tu(t))$

b) Mesa



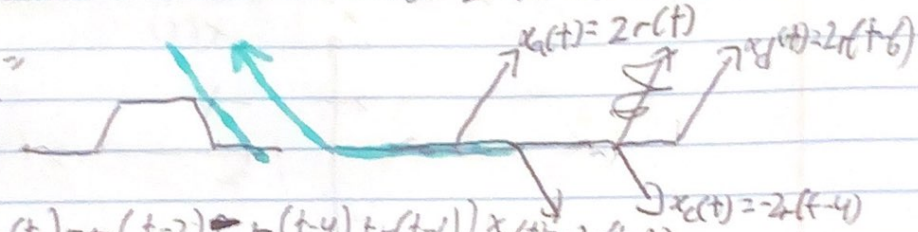
1.23

a) "vee"



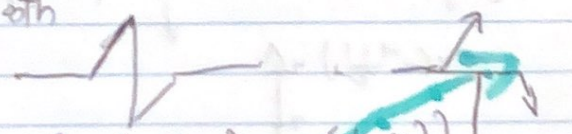
$$x_1(t) = -2r(t) + 4r(t-2) - 2r(t-4)$$
$$= -2tu(t) + 4(t-2)u(t-2) - 2(t-4)u(t-4)$$

b) "mesa"



$$x_2(t) = 2(r(t) - r(t-2) - r(t-4) + r(t-6))$$
$$= 2(tu(t) - (t-2)u(t-2) - (t-4)u(t-4) + (t-6)u(t-6))$$

c) "sawtooth"



$$x_3(t) = 2(r(t) - 8u(t-2) - r(t-4))$$
$$= 2(tu(t) - 8(t-2) - (t-4)u(t-4))$$

1.28

a) $y_1(t) = \int_{-\infty}^{\infty} t^3 \delta(t-2)\,dt$

$= 2^3$

$= 8$

b) $y_2(t) = \int_{-\infty}^{\infty} \cos(t)\,\delta(t-\pi/3)\,dt$

$= \cos(\pi/3)$

$= \frac{1}{2}$

c) $y_3(t) = \int_{-3}^{-1} t^5 \delta(t+2)\,dt$

$= -32$

1.31

a) $x_1(t) = (3 + j2)e^{j\pi t/3}$

b) $x_2(t) = (1 + j2)e^{j2\pi t/3} + (4 + j5)e^{j2\pi t/6}$

c) $x_3(t) = (1 + j2)e^{jt/3} + (4 + j5)e^{jt/2}$

$T_1 = \frac{2\pi}{\pi/3} = 6$

$LCM\left(\frac{2\pi}{2\pi/3}, \frac{2\pi}{2\pi/6}\right) = 6$

$LCM\left(\frac{2\pi}{1/3}, \frac{2\pi}{1/2}\right) =$ irrational no period

October 1, 2002

10/1/2002