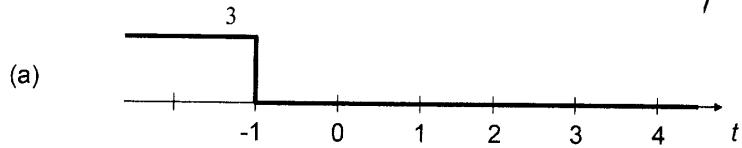


Name: Key

### EE322 Fall 2008 Exam I Worksheet

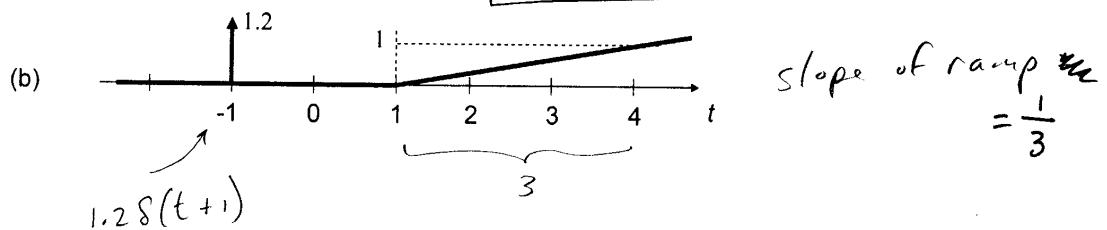
1. Write the equation for the following functions in terms of the basic continuous time functions:

Note: There may be several correct answers for this problem

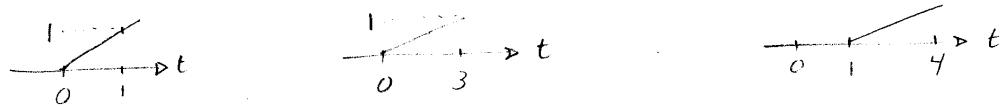


$$3u(t) \xrightarrow{t \rightarrow t-1} 3u(t-1) \xrightarrow{t \rightarrow -t} 3u(-t-1)$$

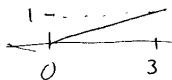
$$\boxed{3u(-t-1)}$$



$$\text{ramp}(t) \xrightarrow{t \rightarrow \frac{t}{3}} \text{ramp}\left(\frac{t}{3}\right) \xrightarrow{t \rightarrow t-1} \text{ramp}\left(\frac{t-1}{3}\right)$$

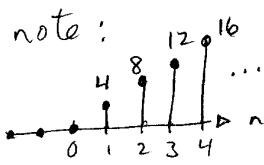


Ans:  
 $\frac{1}{3} \text{ramp}(t)$ :



$$\boxed{1.28(t+1) + \text{ramp}\left(\frac{t-1}{3}\right)}$$

note: also  $1.28(t+1) + \frac{1}{3} \text{ramp}(t-1)$

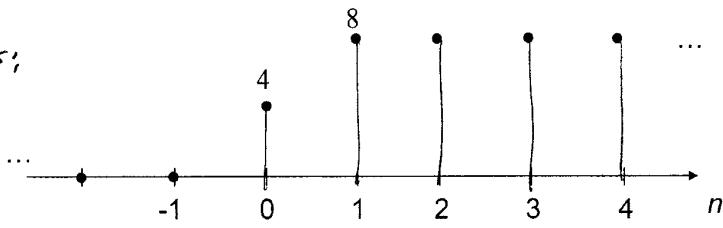


Use ramp functions only to answer part (c).

can be written as:

$$4 \text{ ramp}[n] \quad (\text{c})$$

or  
 $\text{ramp}[4n]$

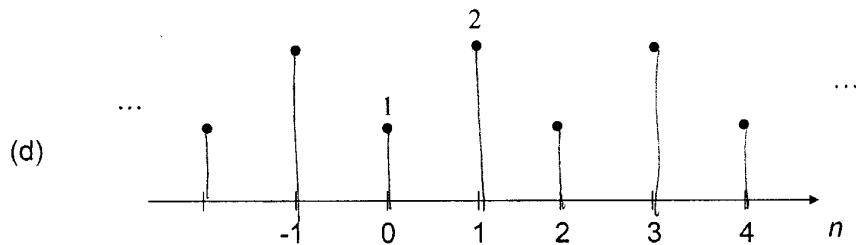


$$4 \text{ ramp}[n+1] - 4 \text{ ramp}[n-1]$$

or

$$\text{ramp}[4(n+1)] - \text{ramp}[4(n-1)]$$

Use periodic impulse functions only to answer part (d).



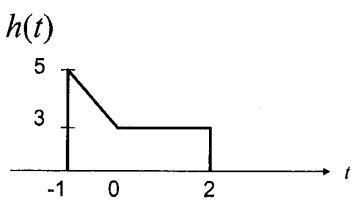
note:  $2\delta_1[n] :$

$\delta_2[n] :$

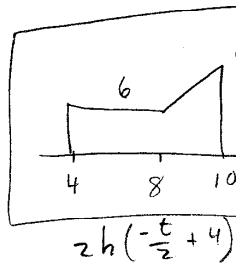
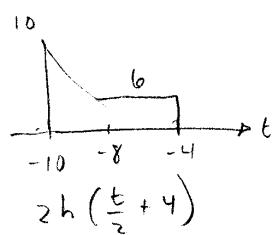
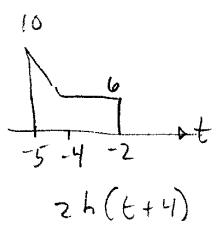
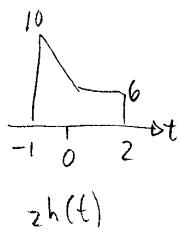
$$2\delta_1[n] - \delta_2[n]$$

or  $\delta_1[n] + \delta_1[n-1]$

2. Given  $h(t)$  shown to the right, plot  $2h\left(-\frac{t}{2}+4\right)$ .

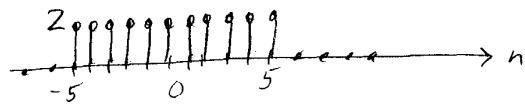


$$2h(t) \xrightarrow{t \rightarrow t+4} 2h(t+4) \xrightarrow{t \rightarrow \frac{t}{2}} 2h\left(\frac{t}{2}+4\right) \xrightarrow{t \rightarrow -t} 2h\left(-\frac{t}{2}+4\right)$$



3. Compute the energy and the power of the following signals, and then determine if they are energy or power signals.

a.  $x[n] = 2 \cdot \text{rect}_s[n]$



$$E_x = (2^2 + 2^2 + \dots + 2^2) = 11 \cdot 4 = \boxed{44}$$

$$P_x = \lim_{N \rightarrow \infty} \frac{1}{2N} (E_x) = \boxed{0}$$

Energy signal

b.  $w(t) = -2 \cdot \sin(2\pi 2115t + \pi/3)$

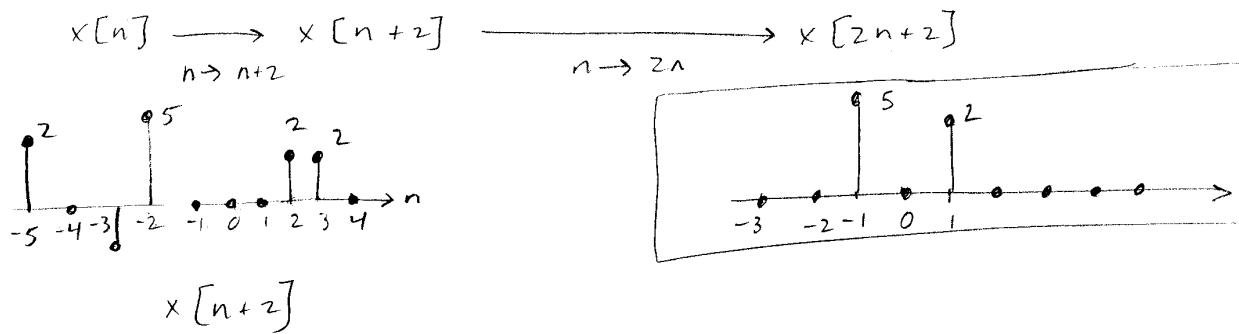
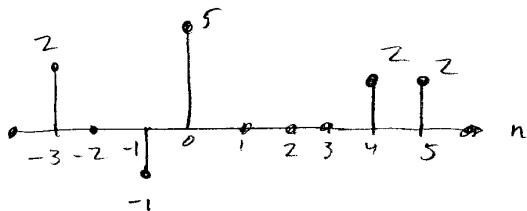
Sinusoid:  $P_{\text{avg}} = \frac{A^2}{2} = \frac{(-2)^2}{2} = \boxed{2}$

periodic  $E_x = \infty$

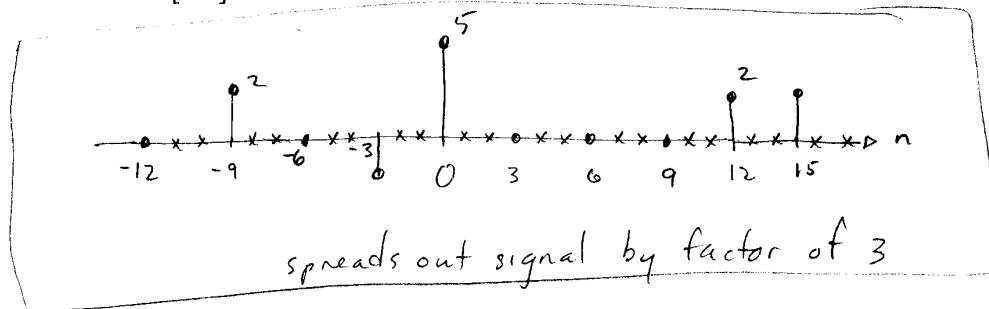
Pwr signal

4. Given a discrete signal described by  $x[n] = 2\delta[n+3] - \delta[n+1] + 5\delta[n] + 2\delta[n-4] + 2\delta[n-5]$ .

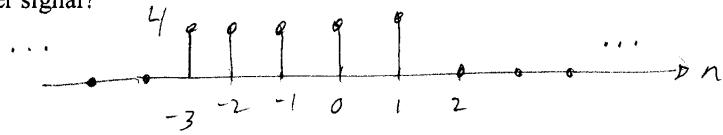
a. Sketch  $x[2n+2]$ .



b. Sketch  $x[n/3]$ .



5. Find the energy and power in the signal  $z[n] = 4u[n+3] - 4u[n-2]$ . Is this an energy signal or a power signal?



$$E_x = 4^2 + 4^2 + 4^2 + 4^2 + 4^2 = \boxed{80}$$

energy signal

6. Find the fundamental period of  $y[n] = 3\sin(0.2\pi n) - 50\cos\left(\frac{7\pi n}{6}\right)$ .

$$3\sin\left(2\pi \frac{1}{10}n\right) - 50\cos\left(2\pi \frac{7}{12}n\right)$$

$N_1 = 10$        $N_2 = 12$

$$N_o = \text{LCM}(N_1, N_2) = \text{LCM}(10, 12) = \boxed{60 \text{ samples}}$$

7. Find and sketch the even and odd parts of  $z(t) = 50u(t+1)$



$$z_e(t) = \frac{z(t) + z(-t)}{2} = \boxed{\begin{array}{c} 25 \\ -1 \quad 0 \quad 1 \end{array} \rightarrow t}$$

$$z_o(t) = z(t) - z_e(t) = \boxed{\begin{array}{c} -25 \\ -1 \quad 0 \quad 1 \end{array} \rightarrow t}$$