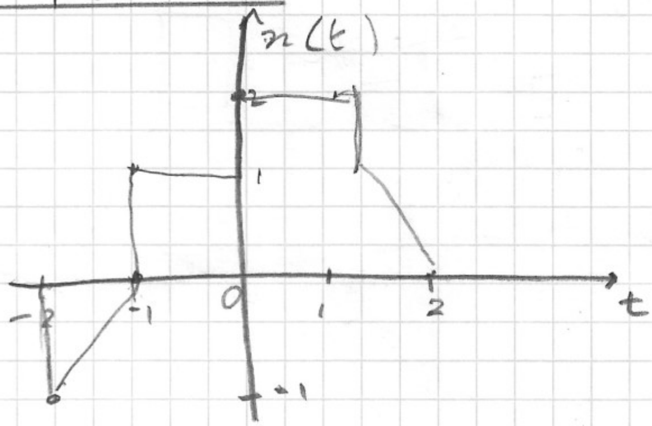
Ficha 1

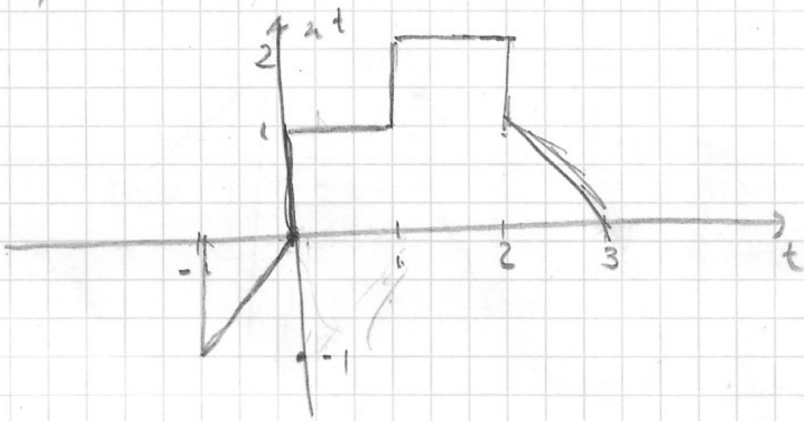
1. Um sinal de tempo contínuo $x(t)$ é mostrado na figura.



Determine cada um dos seguintes sinais e esboce cada um dos seus gráficos:

a) $x(t-1)$

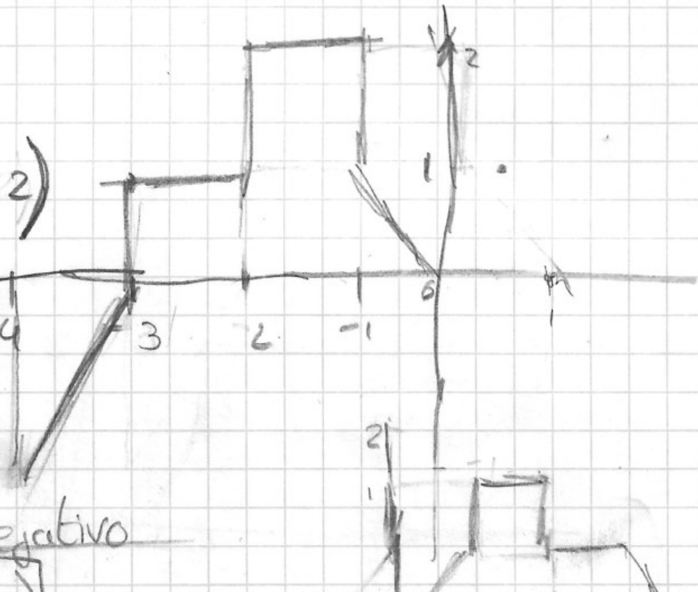
deslocação p direita



b) $x(2-t)$

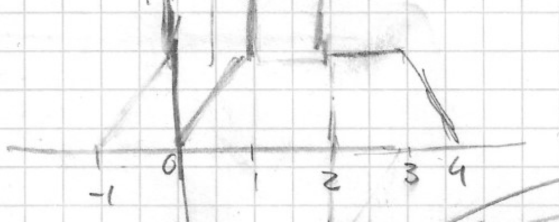
$w(t) = x(t+2)$

↳ • colocar t positivo



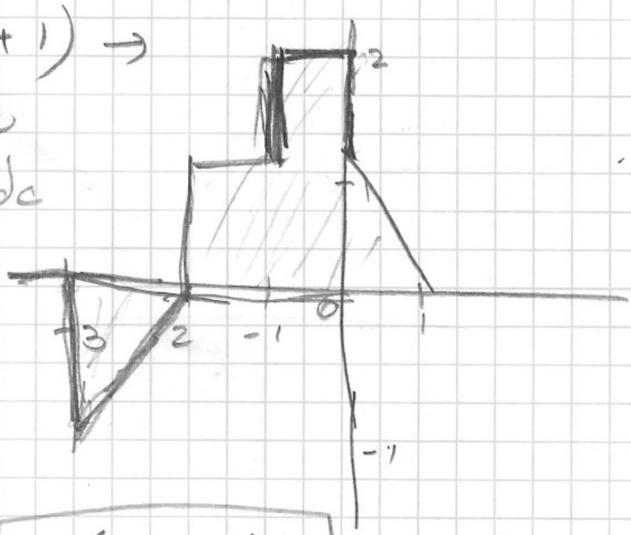
↳ • colocar t negativo

$\boxed{w(-t) = x(-t+2)}$ →



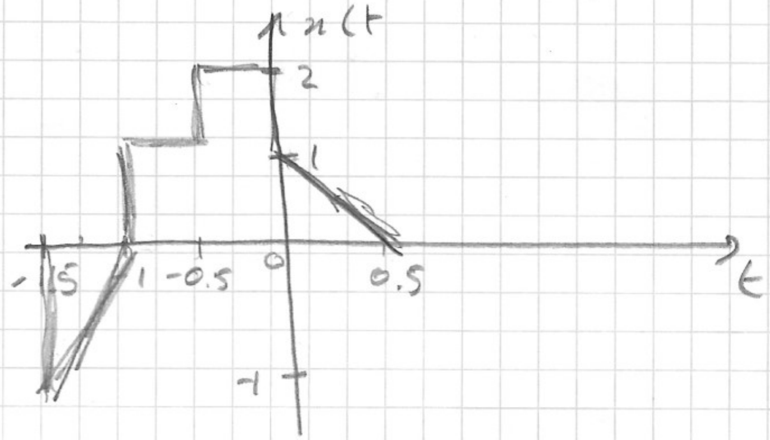
c) $x(2t+1)$

$\Rightarrow w(t) = x(t+1) \rightarrow$ deslocação p esquerda



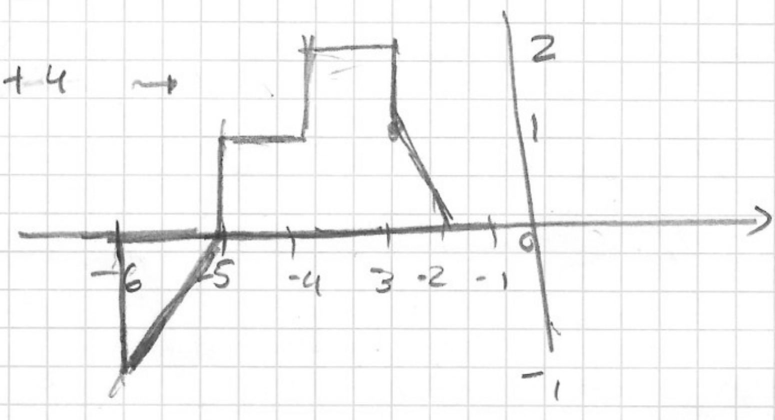
$w(2t) = \boxed{x(2t+1)}$

multiplica o eixo t por 0.5 ou $\frac{1}{2}$



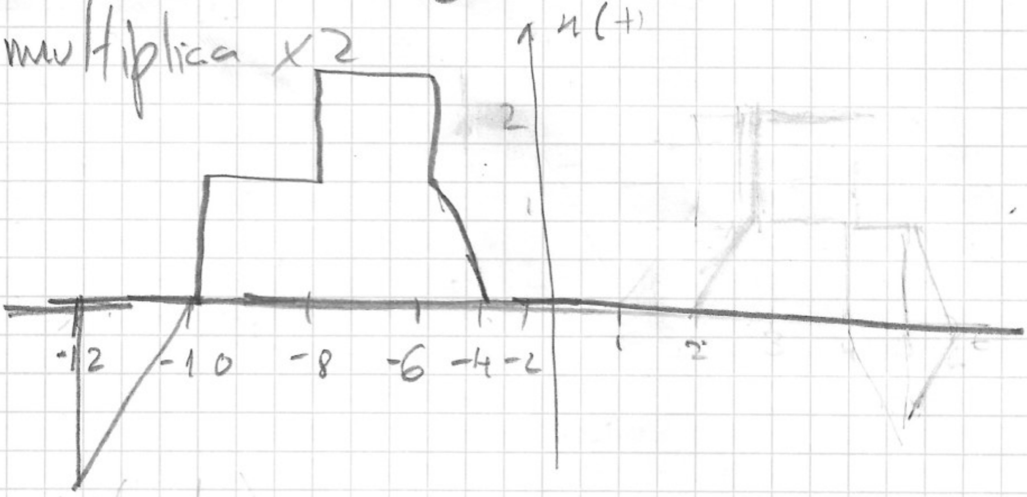
d) $x(4 - t/2)$

$w(t) = t+4 \rightarrow$



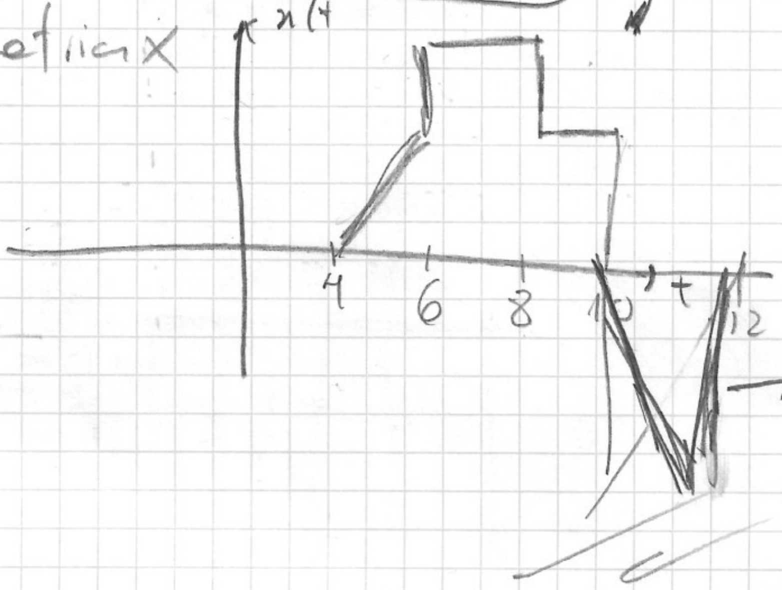
$w\left(\frac{t}{2}\right) = x\left(\frac{t}{2}+4\right)$

multiplica x2



$w\left(-\frac{t}{2}\right) = \boxed{x\left(-\frac{t}{2}+4\right)}$

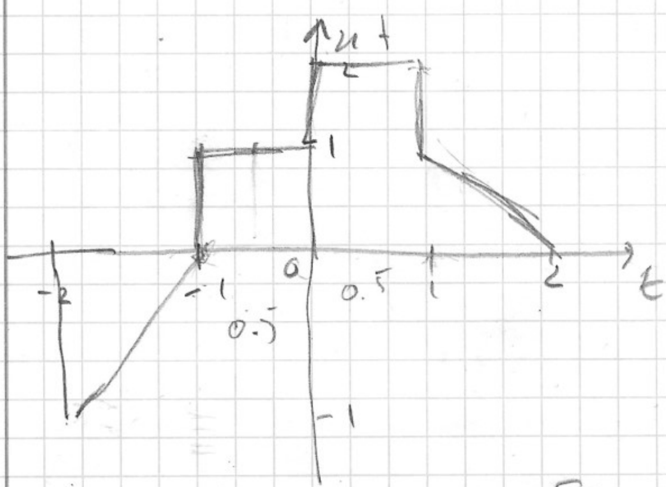
↳ simetria x

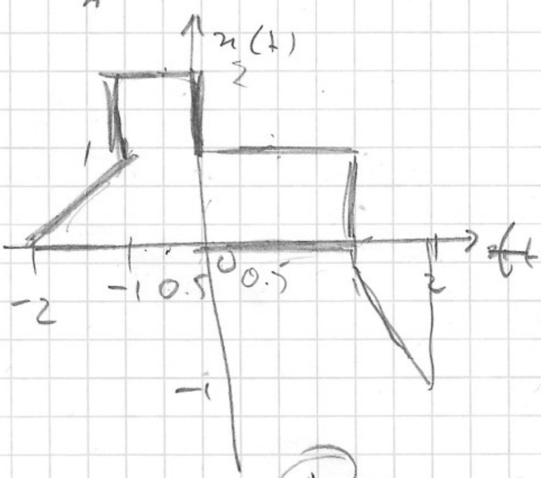


cuidado aí nem tinha reparado nos anteriores na simetria no desenho

e) $[x(t) + (x(-t)] \cdot u(t)$

$x(t) + x(-t)$





Somar ponto a ponto

$-1 \leftarrow -2 \rightarrow 0$ colocar os 2 pts

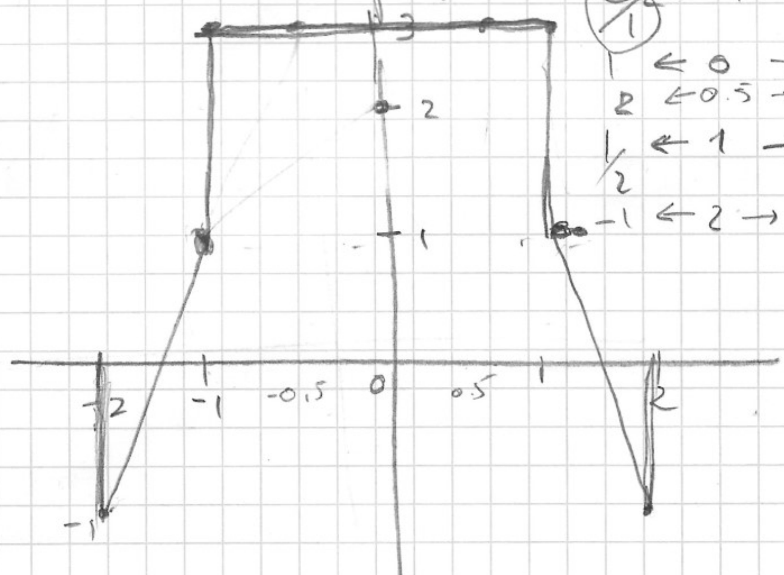
$0/1 \leftarrow -1 \rightarrow 1/2$

$1 \leftarrow 0 \rightarrow 1$

$2 \leftarrow 0.5 \rightarrow 1$

$1/2 \leftarrow 1 \rightarrow 0/1$

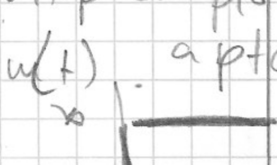
$-1 \leftarrow 2 \rightarrow 0$



$\cdot\, u(t)$

só fica a parte positiva (multiplica pto a pto)

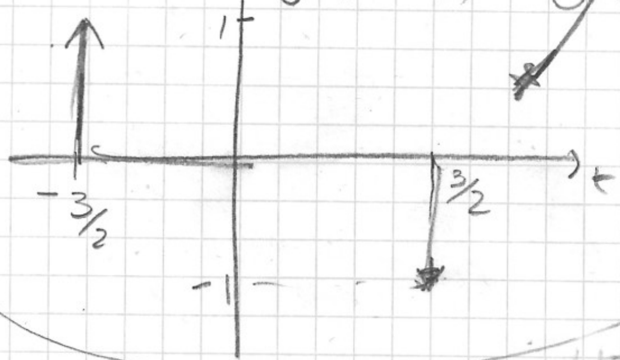
→ pq $u(t)$



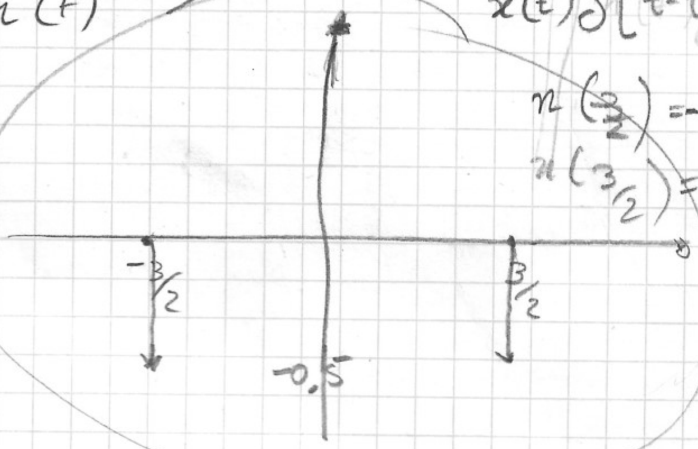
f) $x(t) \cdot [\delta(t + 3/2) - \delta(t - 3/2)]$ → dirac

$\delta\, t + 3/2$

$\delta(t + 3/2) - \delta(t - 3/2)$



$x(t)$



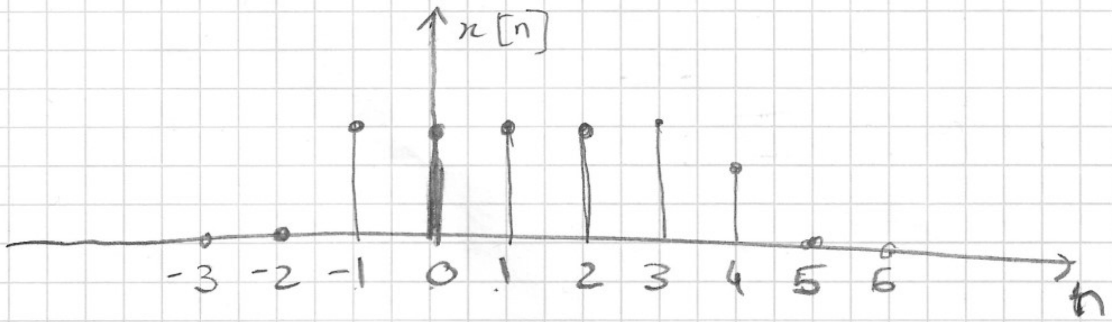
Não esqueer:

$x(t)\delta[t - t_0] = x(t_0)\delta[t - t_0]$

$x(-3/2) = -0.5$

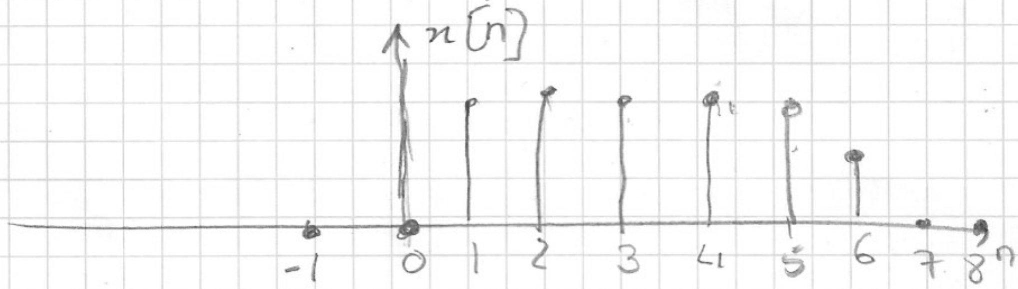
$x(3/2) = 0.5$

2. Um sinal de tempo discreto é mostrado na figura abaixo:

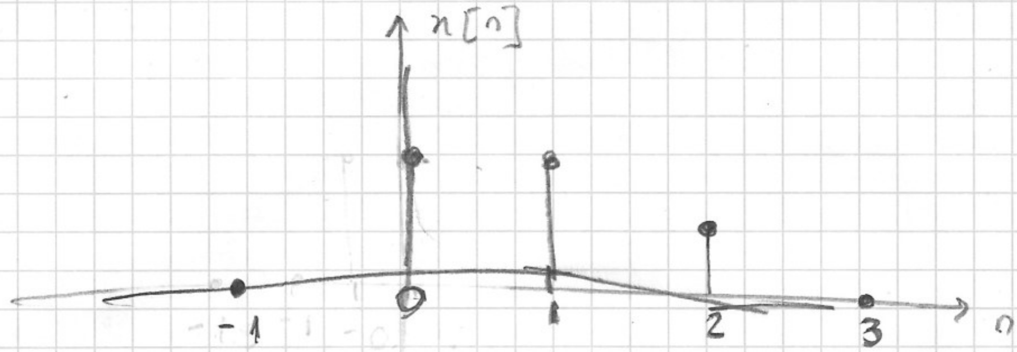


Determine cada um dos seguintes sinais e esboce os respetivos gráficos:

a) $x[n-2]$



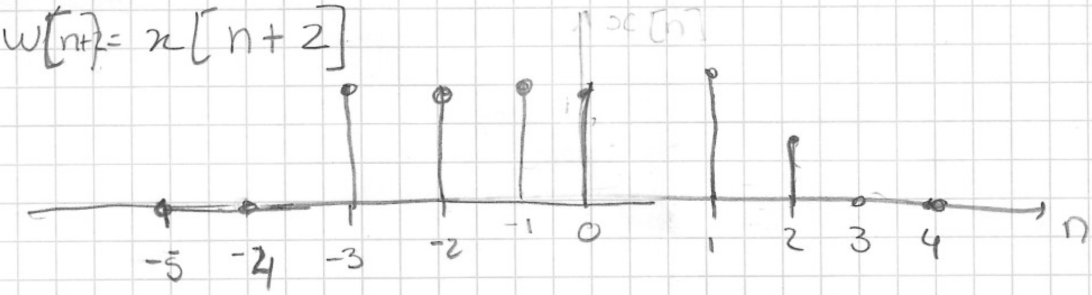
b) $x[2n]$



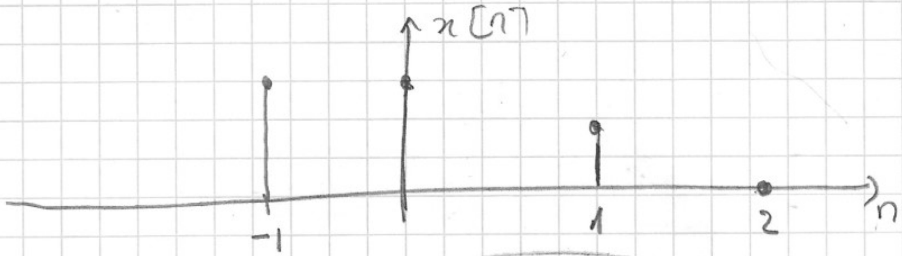
divide-se por 2, mas só contam os resultados inteiros

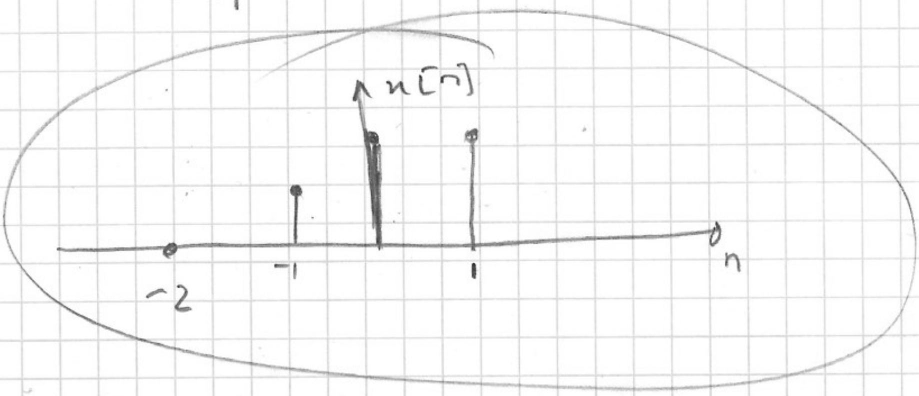
c) $x[2-2n]$

$w[n+2] = x[n+2]$



$w[2n+2] = x[2n+2]$





d) Calcule a energia de $x[n]$

$x[n]$ é discreto → Fórmula pp 1 – 16

$$\boxed{\sum |x[n]|^2} = |x[-3]|^2 + |x[-2]|^2 + x[-1]^2 + x[0]^2 + |x[1]|^2 + |x[2]|^2 + |x[3]|^2 + |x[4]|^2 + |x(5)|^2 + |x(6)|^2$$

Energia total:

$$= 0 + 0 + 1 + 1 + 1 + 1 + 1 + 1 + \frac{1}{4} + 0 + 0$$

$$= 5 + \frac{1}{4} = \frac{20+1}{4} = \frac{21}{4} = 7$$

Como 7 é > 0 e $< \infty$

$x[n]$ é u sinal de energia

vide