

(2) E3. Problem 1.

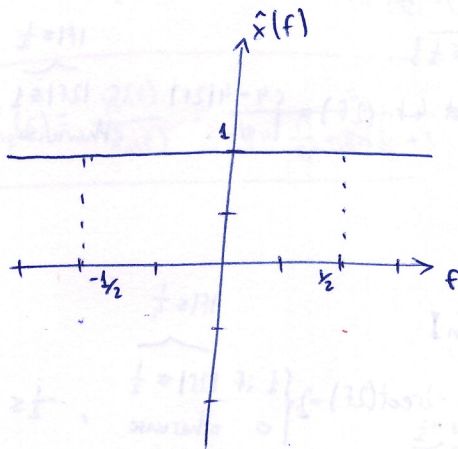
c) $x[n] = x[2n] = \text{sinc}^2\left(\frac{2n}{2}\right) = \text{sinc}^2(n) = y[n] \cdot y[n]$

$y[n] = \text{sinc}(n) \Rightarrow \hat{y}(f) = \text{rect}(f) = \begin{cases} 1 & \text{if } |f| \leq \frac{1}{2} \\ 0 & \text{otherwise} \end{cases}, \quad -\frac{1}{2} \leq f \leq \frac{1}{2} \Rightarrow \hat{y}(f) = 1$

~~$\hat{x}(f) = \hat{y}(f) * \hat{y}(f) = \text{tri}(f) = \begin{cases} 1-|f| & |f| \leq 1 \\ 0 & \text{otherwise} \end{cases}$~~

~~$\hat{x}(f) = 1 * 1 = 1$~~ ~~$\hat{x}(f) = \hat{y}(f) * \hat{y}(f) = 1 * 1 = 1 = \hat{y}(f)$~~ ^{circular conv.}

$\hat{x}(f) = \sum_{n=-\infty}^{\infty} \text{sinc}^2(n) e^{-j2\pi f n} = \sum_{n=-\infty}^{\infty} (y[n])^2 e^{-j2\pi f n} = 1$



There is aliasing

