

Problem-solving session

Sampling

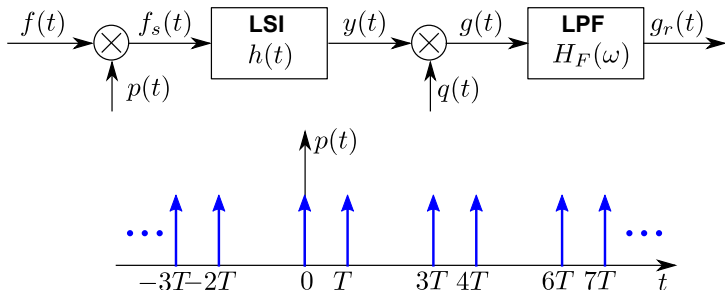
Jaime Laviada

Área de Teoría de la Señal y Comunicaciones
Universidad de Oviedo

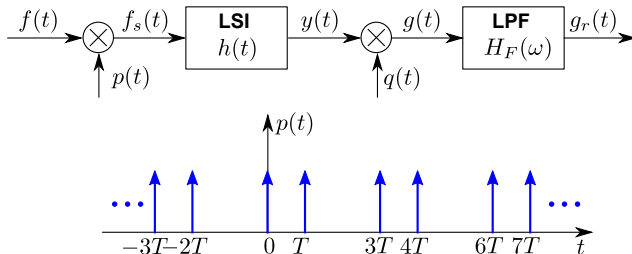
Exercise #1

(based on exercise 4.27 from Vol. ST-II by Emilio Gago)

Let us consider the scheme shown in the image below, where (i) the signal $f(t)$ is band-limited with a bandwidth ω_m and its spectrum is real, (ii) the signal $p(t)$ is the modified train of impulses shown below, (iii) the impulse response $h(t)$ of the LSI system is a pulse with a width $2T$, and (iv) $q(t) = \exp(j\frac{2\pi}{3T}t)$

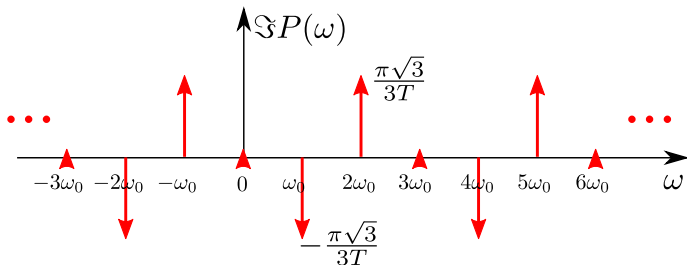
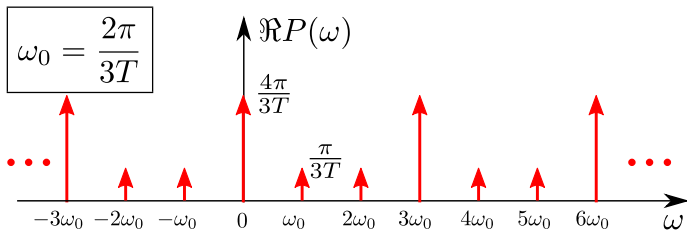


Exercise #1

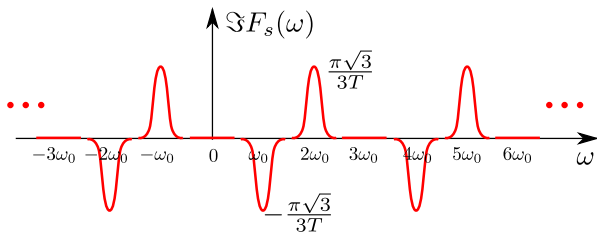
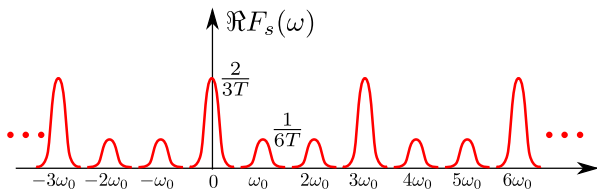
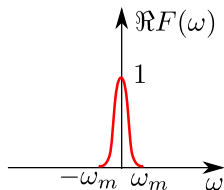


- 1 Calculate the spectrum $P(\omega)$ as a function of T and sketch it.
- 2 Determine and sketch the signals $f_s(t)$ y $F_s(\omega)$. Find the requirements about the parameter T so that the signal $f(t)$ can be recovered from $f_s(t)$.
- 3 Determine the transfer function $H_F(\omega)$, which results in $g_r(t) = f(t)$.
- 4 Sketch the process from the previous section.

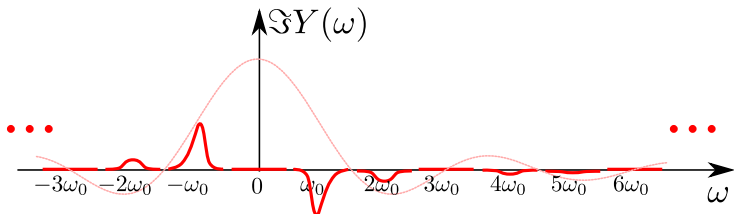
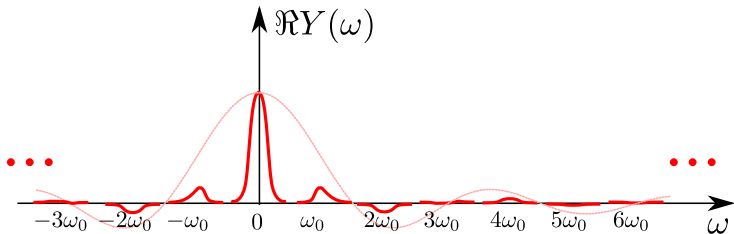
Exercise #1: Solution



Exercise #1: Solution



Exercise #1: Solution



Exercise #1: Solution

