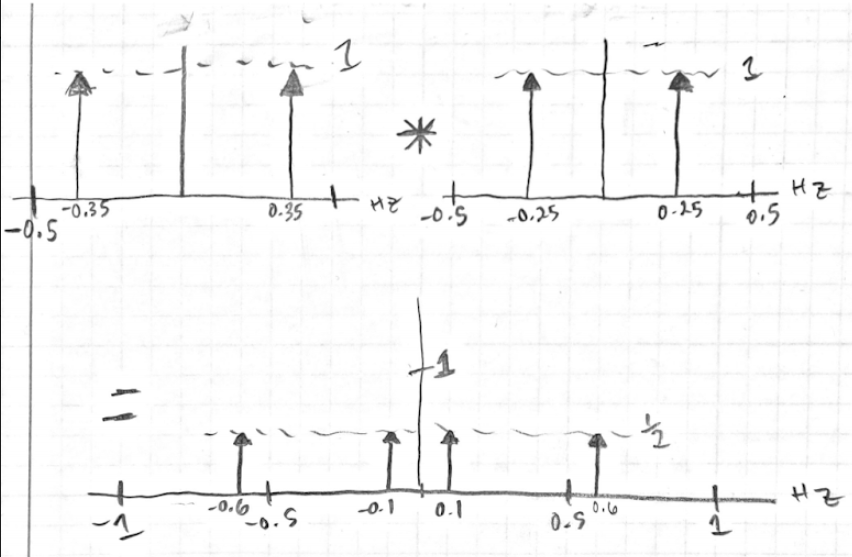


Multiplying in time 🡪 Convolution in frequency

Sinusoids with and will have impulses in the frequency domain at these frequencies

Multiplying these two sinusoids will lead to a of:



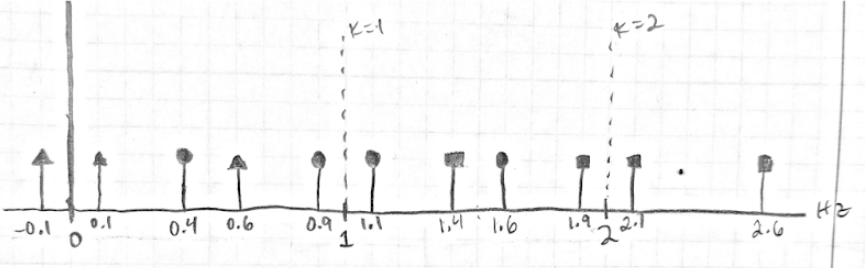
π/2

π

π

π

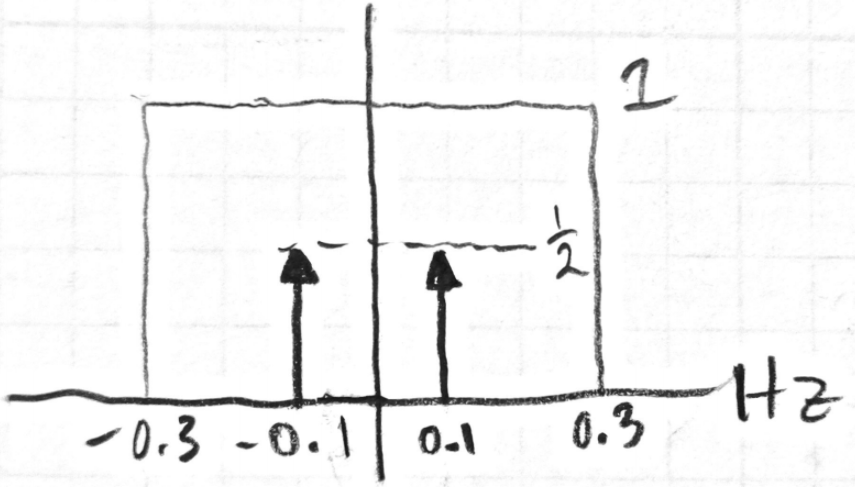
Sampling at will lead to periodic replications of centered around integer multiples of 1Hz



π/2

We can see that the replications do overlap into the original BW of x(t), but they do not add onto the original spectra

If an ideal LPF with is applied:



π/2

If this is passed through a perfect reconstruction filter with :

Since this will reconstruct the signal to be:

This could have been achieved by passing our original signal, x(t), through an ideal LPF with pass band gain of 0.5 and a cutoff frequency of 0.3Hz