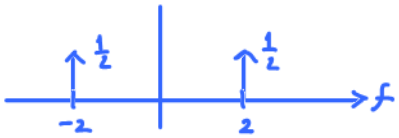
ECS 332: In-Class Exercise # 18_2

Instructions

1. Separate into groups of no more than three persons. **The group cannot be the same as any of your former groups after the midterm.**
2. Write down all the steps that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do not panic.**

Date: **16** / **11** / 2018			
Name	ID (last 3 digits)		
Prapun	**5**	**5**	**5**

Consider a continuous-time signal $g(t) = \cos(2\pi(2)t)$. $\xrightarrow{\mathcal{F}} G(f)$



(a) Find the Nyquist sampling rate for this signal.

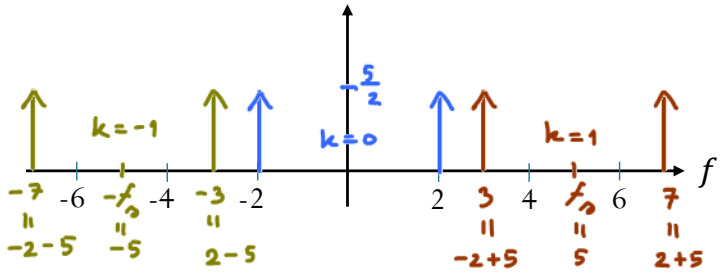
This g(t) has only one frequency = 2 Hz.

Nyquist sampling rate $= 2 \times f_{max} = 2 \times 2 = 4$ [Sa/s]

(b) The ideal sampled signal $g_\delta(t)$ is defined by $g_\delta(t) = \sum_{n=-\infty}^{\infty} g[n]\,\delta(t - nT_s)$ where T_s is the sampling interval.

Plot the **Fourier transform** of $g_\delta(t)$ from $f = -6$ to $f = 6$

a. when $T_s = 0.2$ $\Rightarrow f_s = \frac{1}{T_s} = \frac{1}{0.2} = 5$



b. when $T_s = 0.4$ $\Rightarrow f_s = \frac{1}{T_s} = \frac{1}{0.4} = \frac{10}{4} = \frac{5}{2}$

Originally, the size of each δ function is $\frac{1}{2}$. Here we need to scale them by $f_s = \frac{5}{2}$. Therefore, their size $= \frac{5}{2} \times \frac{1}{2} = \frac{5}{4}$