EES 351: In-Class Exercise # 2

Instructions

1. Work alone or in a group of no more than three students. For group work, **the group cannot be the same as any of your former groups in this class.**
2. [ENRE] = Explanation is not required for this exercise.
3. Only one submission is needed for each group.
4. You have two choices for submission:
   (a) Online submission via Google Classroom
   - PDF only.
   - Only for those who can directly work on the posted files using devices with pen input.
   - Paper size should be the same as the posted file.
   - No scanned work, photos, or screen capture.
   - Your file name should start with the 10-digit student ID of one member.
     (You may add the IDs of other members, exercise #, or other information as well.)

   (b) Hardcopy submission
5. **Do not panic.**

Date: 26 / 8 / 2020			
Name	ID (last 3 digits)		
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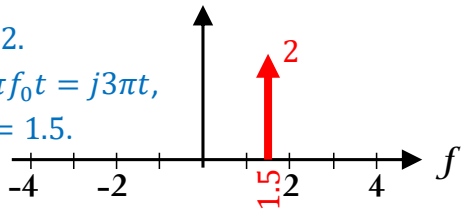
1. [ENRPr] Consider each $g(t)$ defined below.

   Let $G(f)$ be its Fourier transform. Plot $G(f)$ from $f=-4$ to $f=4$ Hz.

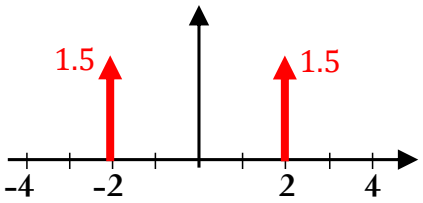
   a. $g(t)=2e^{j3\pi t}$

   $Ae^{j2\pi f_0 t} \overset{\mathcal{F}}{\Longleftrightarrow} A\delta(f-f_0)$

   Here, $A=2$.
   Setting $j2\pi f_0 t = j3\pi t$, we get $f_0 = 1.5$.



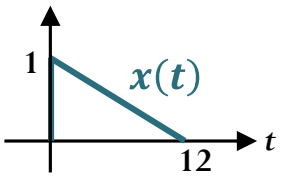
   b. $g(t)=3\cos(4\pi t)$

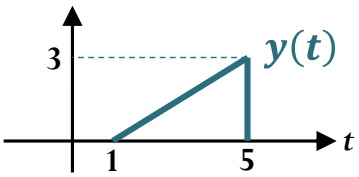


   Don't forget to scale the size of each δ-function by $\frac{1}{2}$.

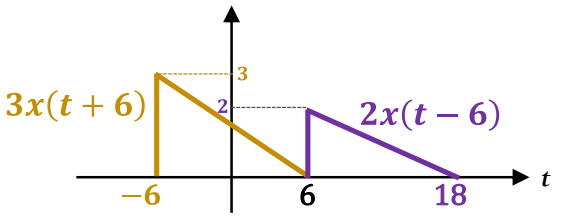
   $A\cos(2\pi f_0 t) \overset{\mathcal{F}}{\Longleftrightarrow} \frac{A}{2}\delta(f-(-f_0))+\frac{A}{2}\delta(f-f_0)$

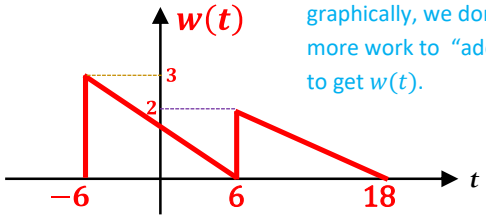
2. [ENRPr] Signals $x(t)$ and $y(t)$ are plotted below.





   a) Plot the signal $w(t)=2x(t-6)+3x(t+6)$.

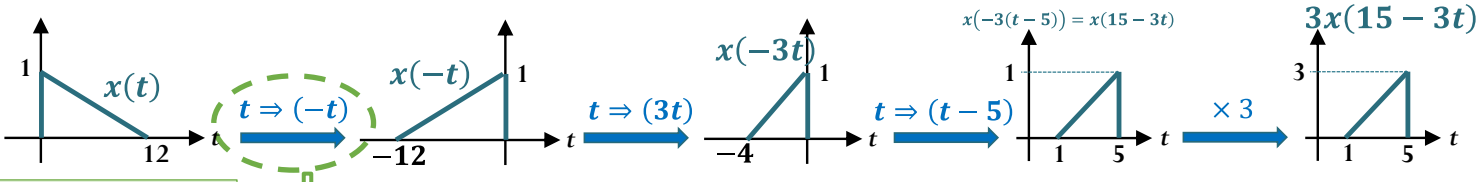




   Remark: There is no nonzero overlapping part between $3x(t+6)$ and $2x(t-6)$. Therefore, graphically, we don't need to do any more work to "add" the two graphs to get $w(t)$.

   b) Suppose $y(t)=c_1x(c_2t+c_3)$. Find the values of the constants $c_1, c_2,$ and c_3.

   $c_1 =$ 3 , $c_2 =$ −3 , $c_3 =$ 15 .



This notation means we replace t by "$-t$".

Caution: One common mistake is that, in the third step, when we shift the graph to the right by 5 units, we can't just put "−5" blindly into the expression and get $x(-3t-5)$; we need to replace t by $t-5$.