ECS 332: In-Class Exercise # 2 **Solution**

Instructions

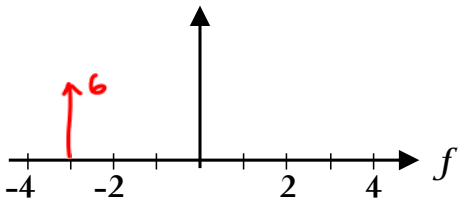
1. Separate into groups of no more than three persons. **The group cannot be the same as any of your former groups.**
2. **Write down all the steps** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do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

Date: **2 4** / **0 8** / 2018			
Name	ID (last 3 digits)		
Prapun	**5**	**5**	**5**

1. Consider each $g(t)$ defined below.

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

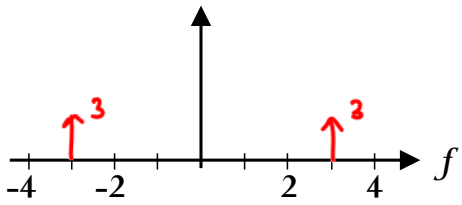
   a. $g(t)=6e^{-j6\pi t}$ → $f_0=-3$



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

Here, $A=6$. Also, $j2\pi f_0 t = -j6\pi t$, $f_0=-3$.

   b. $g(t)=6\cos(6\pi t)$ → $f_0=3$

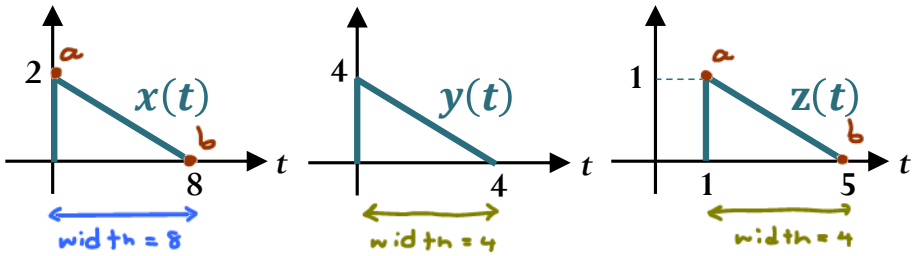


$\cos(2\pi f_0 t) \longrightarrow \frac{1}{2}\delta(f+f_0)+\frac{1}{2}\delta(f-f_0)$

$A\cos(2\pi f_0 t) \longrightarrow \frac{A}{2}\delta(f+f_0)+\frac{A}{2}\delta(f-f_0)$

$\frac{A}{2}=\frac{6}{2}=3$

2. Signals $x(t)$, $y(t)$, and $z(t)$ are plotted below.



Suppose $y(t)=c_1x(c_2t+c_3)$ and $z(t)=c_4x(c_5t+c_6)$.

Find the values of the constants c_1, c_2, c_3, c_4, c_5, and c_6:

$c_1 =$ 2 , $c_2 =$ 2 , $c_3 =$ 0 , $c_4 =$ 1/2 , $c_5 =$ 2 , $c_6 =$ −2 .

vertical scaling by a factor of 2

Horizontal compression by a factor of 2.

no shift

vertical scaling by a factor of 1/2

Horizontal compression by a factor of 2.

shift $\frac{1}{2}x(2t)$ to the right by 1. $t \to t-1$

$\frac{1}{2}x(2t) \longrightarrow \frac{1}{2}x(2(t-1)) = \frac{1}{2}x(2t-2)$

Alternatively,

Point a: $c_5t+c_6\big|_{t=1} = 0$

Point b: $c_5t+c_6\big|_{t=5} = 8$

$c_5+c_6=0$

$5c_5+c_6=8$

$5c_5-c_5=8$

$c_5=2$

$c_6=-c_5=-2$