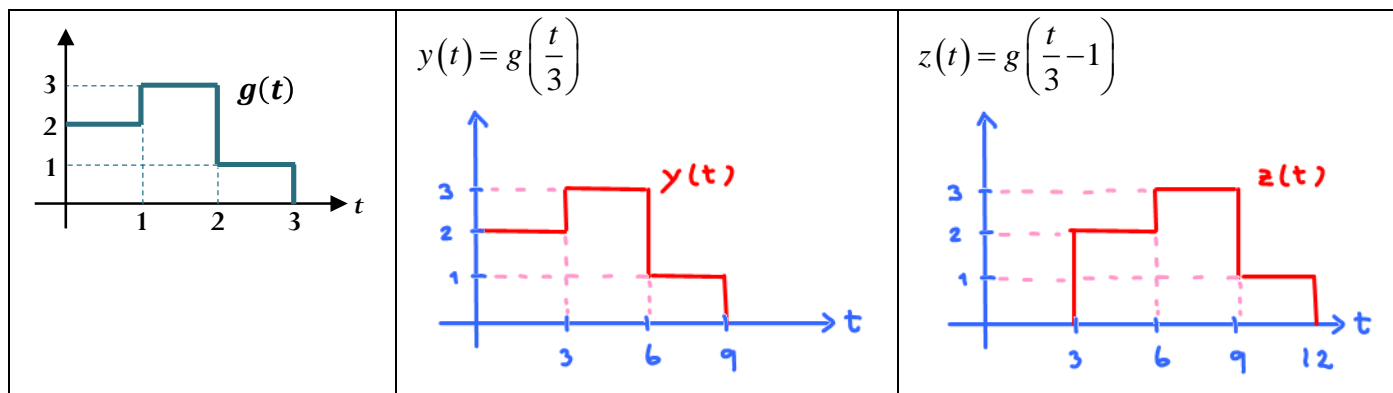# ECS 332: In-Class Exercise 2 Solution

Instructions

1. Separate into groups of no more than three persons.
2. **The group cannot be the same as your former group.**
3. Only one submission is needed for each group.
4. **Only this page will be scanned and graded. Work only on this page.**
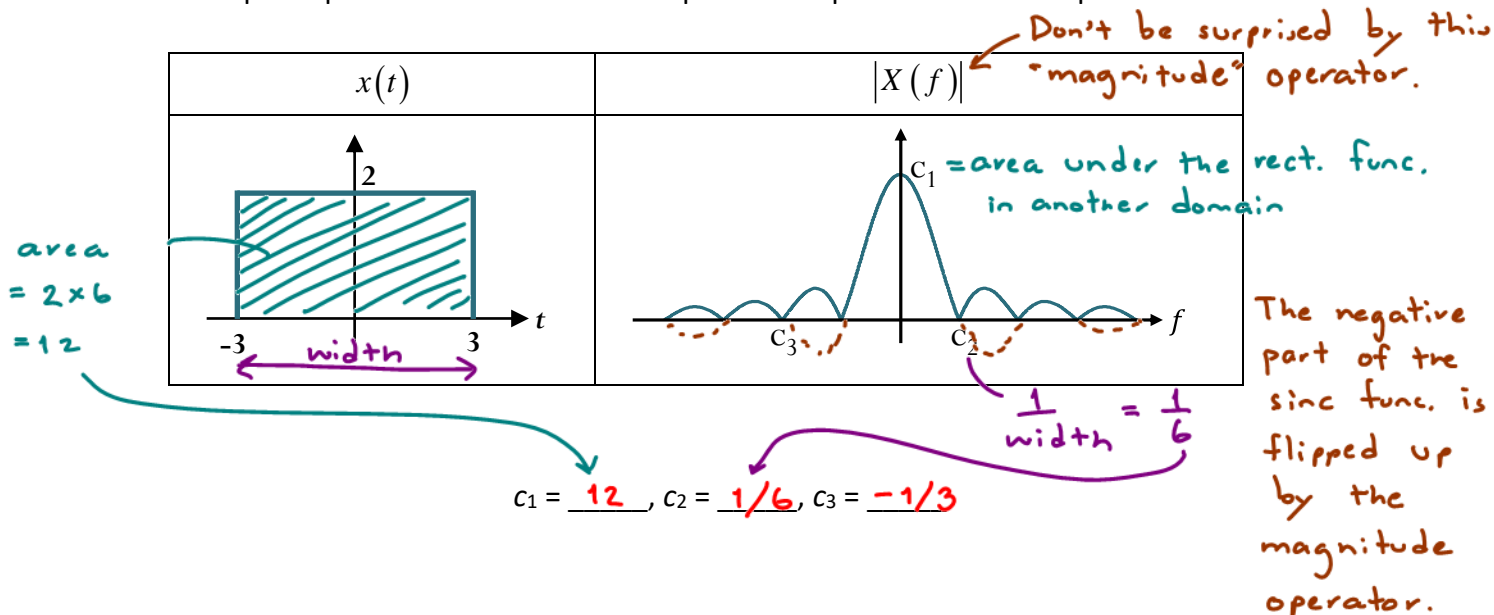5. **Do not panic.**

Name	ID
Prapun	**555**

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1. A signal $g(t)$ is plotted below. Plot the other two signals.

$$y(t) = g\left(\frac{t}{3}\right)$$

$$z(t) = g\left(\frac{t}{3} - 1\right)$$

$$g(t) \xrightarrow[\substack{t \to \frac{t}{3} \\ \text{Expand} \\ \text{horizontally} \\ \text{by a factor of 3}}]{} y(t) = g\left(\frac{t}{3}\right) \xrightarrow[\substack{t \to t-3 \\ \text{shift to} \\ \text{the right} \\ \text{by 3 time} \\ \text{units.}}]{} z(t) = y(t-3)$$

$$= g\left(\frac{t-3}{3}\right)$$
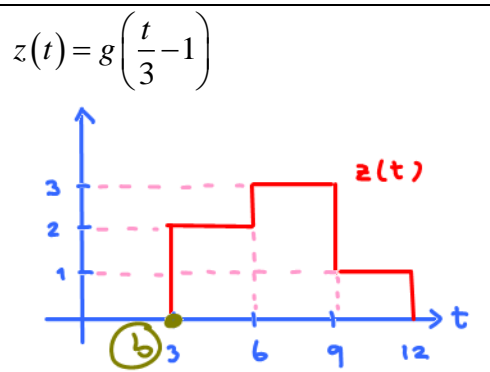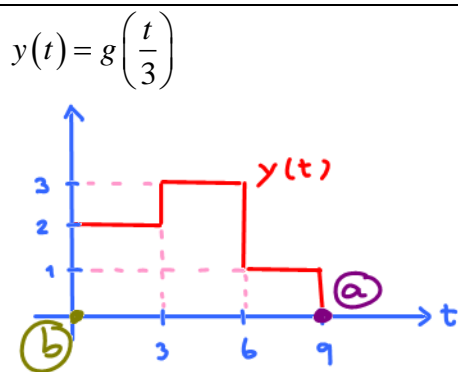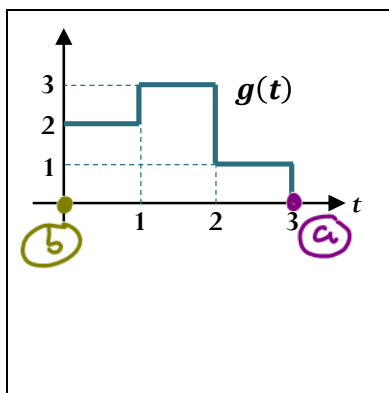
$$= g\left(\frac{t}{3} - 1\right)$$

See the next page for alternative solutions.

2. The plot of a signal and the corresponding magnitude plot of its Fourier transform is provided below. Find the values of the constants (corresponding to the zeroes and the peaks) shown in the plot. Put your answers in the spaces provided at the end of the question. Explanation is not required.

Don't be surprised by this "magnitude" operator.

C_1 = area under the rect. func. in another domain

area $= 2 \times 6$ $= 12$

$\frac{1}{\text{width}} = \frac{1}{6}$

The negative part of the sinc func. is flipped up by the magnitude operator.

$C_1 = \underline{12}$, $C_2 = \underline{1/6}$, $C_3 = \underline{-1/3}$

Alternative Solutions

$$y(t) = g\left(\frac{t}{3}\right)$$

$$z(t) = g\left(\frac{t}{3} - 1\right)$$

First, we try to identify where point ⓐ would be on the new plots. Note that it happens when we plug the number "3" into the func. g(t).

Next, consider point ⓑ. Note that it happens when we plug the number "0" into the func. g(t).

Here, point ⓐ happens on the plot when
$$\frac{t}{3} = 3;$$
that is,
$$t = 9.$$

Here, point ⓑ happens on the plot when
$$\frac{t}{3} = 0;$$
that is
$$t = 0.$$

Here, point ⓐ happens on the plot when
$$\frac{t}{3} - 1 = 3;$$
that is,
$$t = 12.$$

Here, point ⓑ happens on the plot when
$$\frac{t}{3} - 1 = 0;$$
that is
$$t = 3.$$

Other points on the plot can be analyzed in a similar manner.

solution ✳3 for z(t).

On the previous page, we scale the time first; then we shift it. Here, we can try to do the shifting first, followed by time-scaling.

$$g(t) \xrightarrow[t \to t-1]{} v(t) = g(t-1) \xrightarrow[t \to t/3]{} z(t) = v\left(\frac{t}{3}\right) = g\left(\frac{t}{3} - 1\right)$$

Shift to the right by one time unit.

Expand horizontally by a factor of 3