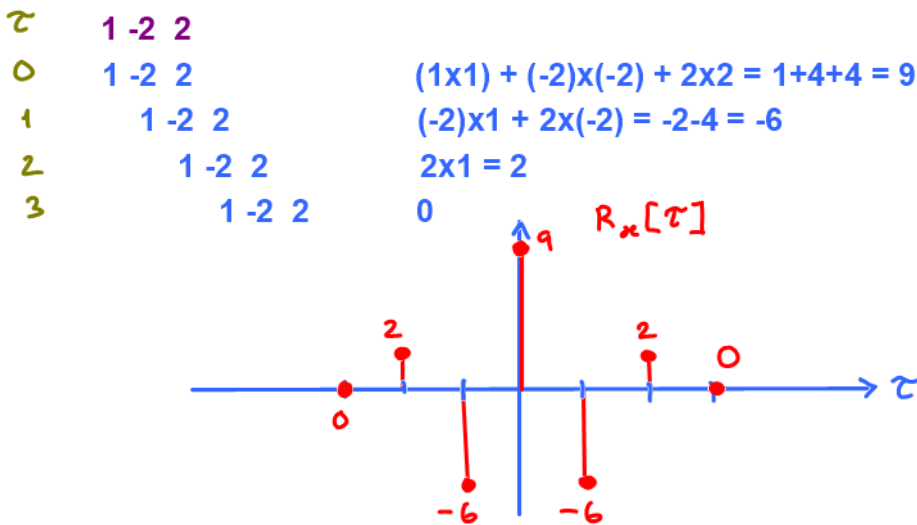# ECS 455: In-Class Exercise # <u>10</u>

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. **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.
5. **Do not panic.**

Date: <u>0 7</u> / <u>0 4</u> / 2017

Name		ID (last 3 digits)		
Prapun		**5**	**5**	**5**

1. Consider a sequence x[n] = (1, -2, 2). Plot its autocorrelation function $R_X[\tau]$ from $\tau = -3$ to 3.

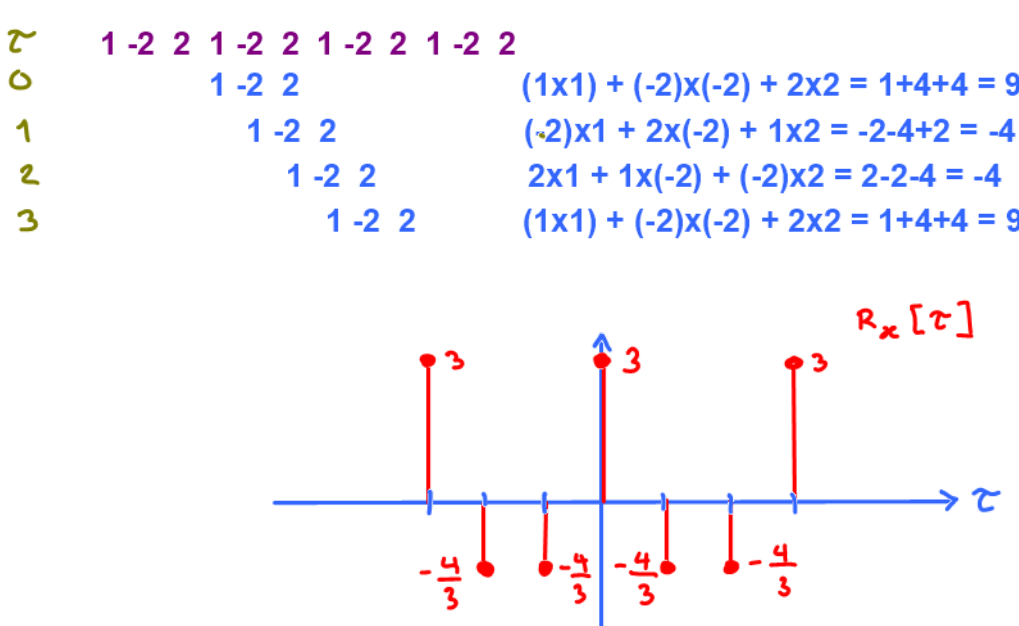| τ	1 -2 2		$R_x[\tau]$
0	1 -2 2	(1x1) + (-2)x(-2) + 2x2 = 1+4+4 = 9	9
1	1 -2 2	(-2)x1 + 2x(-2) = -2-4 = -6	-6
2	1 -2 2	2x1 = 2	2
3	1 -2 2	0	0

The values for $\tau < 0$ can be found from the fact that $R_x[\tau]$ is an even function.

2. Consider a **periodic** sequence x[n]. Each complete cycle of it is a sequence (1, -2, 2). ← period = 3

Plot its autocorrelation function $R_X[\tau]$ from $\tau = -3$ to 3.

τ	1 -2 2 1 -2 2 1 -2 2 1 -2 2		$\times \frac{1}{3}$	$R_x[\tau]$
0	1 -2 2	(1x1) + (-2)x(-2) + 2x2 = 1+4+4 = 9 ⟶		3
1	1 -2 2	(-2)x1 + 2x(-2) + 1x2 = -2-4+2 = -4 ⟶		-4/3
2	1 -2 2	2x1 + 1x(-2) + (-2)x2 = 2-2-4 = -4 ⟶		-4/3
3	1 -2 2	(1x1) + (-2)x(-2) + 2x2 = 1+4+4 = 9 ⟶		3

The values for $\tau < 0$ can be found from the fact that $R_x[\tau]$ is an even function.