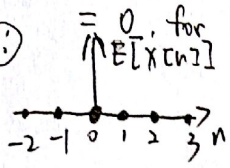
ECE 581

11-1 (a) (i) $E[X[n]]$

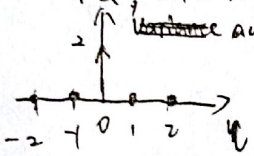
$= 0$, for n : integer.

(ii)

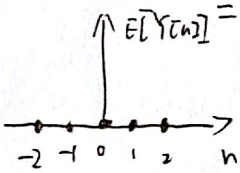


(b) $E[X[n_1]X[n_2]]$

$= \begin{cases} 0, & n_1 \neq n_2 \\ 2, & n_1 = n_2. \end{cases} = 2\delta[l], \; l = n_1 - n_2$



(c). $E[Y[n]] = E[X[n]] + E[X[n-2]]$



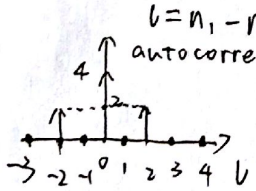
(d). $E[Y[n_1]Y[n_2]]$

$= E[X[n_1]X[n_2]] + E[X[n_1]X[n_2-2]]$

$+ E[X[n_1-2]X[n_2]] + E[X[n_1-2]X[n_2-2]]$

$= 4\delta[l] + 2\delta[l-2] + 2\delta[l+2]$

$l = n_1 - n_2$



(e). $E[Y[n_1]Y[n_2]]$

$= R_Y[l]$, $l = n_1 - n_2$.

according above, $R_Y[1] = R_Y[-1] = 0$

$= E[Y[n_1]]E[Y[n_1 \pm 1]]$

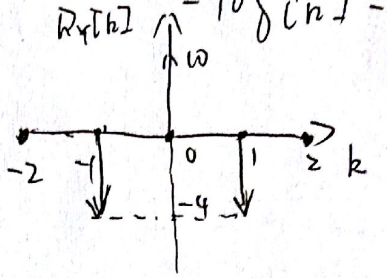
∴ uncorrelated.

11-2 (a). input $X[k]$ is a wss

∴ $Y[k]$ is also a wss

∴ $R_Y[k] = R_X[k] * h[k] * h[-k]$

$R_Y[k] = 10\delta[n] - 4\delta[k+1] - 4\delta[k-1]$



(b). $R_Y[0] - \text{mean}^2 = \text{Variance of output.}$

mean of output = 0.

∴ variance of output = 10.

= Variance of $Y[k]$