

EE 451 – HW1

- 2.7. (a) $y[n]=h[0]x[n]+h[1]x[n-1]+h[2]x[n-2]$
 (b) $y[n]=h[0](x[n]+\beta_{11}x[n-1]+\beta_{21}x[n-2])+\beta_{12}h[n0](x[n-1]+\beta_{11}x[n-2]+\beta_{21}x[n-3])+\beta_{22}h[0](x[n-2]+\beta_{11}x[n-3]+\beta_{21}x[n-4])$
- 2.10. (a) $x_{1,ev}[n]=\begin{cases} 1/2, & n \geq 3 \\ 0, & -2 \leq n \leq 2 \\ 1/2, & n \leq -3 \end{cases}$
 $x_{1,od}[n]=\begin{cases} 1/2, & n \geq 3 \\ 0, & -2 \leq n \leq 2 \\ -1/2, & n \leq -3 \end{cases}$
 (b) $x_{1,ev}[n]=\begin{cases} 1/2\alpha^n, & n \geq 3 \\ 0, & -2 \leq n \leq 2 \\ 1/2\alpha^{-n}, & n \leq -3 \end{cases}$
 $x_{1,od}[n]=\begin{cases} 1/2\alpha^n, & n \geq 3 \\ 0, & -2 \leq n \leq 2 \\ -1/2\alpha^{-n}, & n \leq -3 \end{cases}$
- 2.25 (a) $P_{x,1} = 1$
 $\mathcal{E}_{x,1} = \infty$
 (b) $P_{x,2} = 1/2$
 $\mathcal{E}_{x,2} = \infty$
- 2.29 (a) $\varphi = \pi/4, A = 2^{1/2}, \omega_0 = \pi/2$
 (b) $\varphi = \pi/2, A = 2^{1/3}, \omega_0 = \pi/2$
- 2.38 The system is linear, time-invariant and noncausal
- 2.50 (a) $\{-24,42,-5,-20,-45,23,66,-25,-42,-17,22,14,-4\} \quad -4 \leq n \leq 8$
 (b) $\{-12,7,5,10,-16,-3,-28,30,13,-6,-15,-4,10\} \quad -1 \leq n \leq 11$
- 2.65 $y[n]=5\delta[n-5] + 9\delta[n-3] + 2\delta[n-1] + 3\delta[n+1] - 6\delta[n+3]$

M2.3 `L=41; A=1.5; w0=[0.6,0.28,0.45,0.55,0.65]; phi=0;`
`n=0:L-1;`
`for i=1:5`
 `x=A*cos(w0(i)*pi*n+phi);`
 `subplot(3,2,i); stem(n,x);`
 `xlabel('Time index'); ylabel('Amplitude');`
 `title(['\omega_{o}=',num2str(w0(i)),'\pi']);`
`end`

M2.9 `x=[-4 5 1 -2 -3 0 2];`
`y=[6 -3 -1 0 8 7 -2];`
`w=[3 2 2 -1 0 -2 5];`
`n=-6:6;`

`rx=xcorr(x);`
`subplot(3,2,1); stem(n,rx);`
`xlabel('Lag index'); ylabel('Amplitude'); title(['r_{xx}[n]']);`

`ry=xcorr(y);`
`subplot(3,2,2); stem(n,ry);`
`xlabel('Lag index'); ylabel('Amplitude'); title(['r_{yy}[n]']);`

`rw=xcorr(w);`
`subplot(3,2,3); stem(n,rw);`
`xlabel('Lag index'); ylabel('Amplitude'); title(['r_{ww}[n]']);`

`rxxy=xcorr(x,y);`
`subplot(3,2,4); stem(n,rxxy);`
`xlabel('Lag index'); ylabel('Amplitude'); title(['r_{xy}[n]']);`

`rxw=xcorr(x,w);`
`subplot(3,2,5); stem(n,rxw);`
`xlabel('Lag index'); ylabel('Amplitude'); title(['r_{xw}[n]']);`