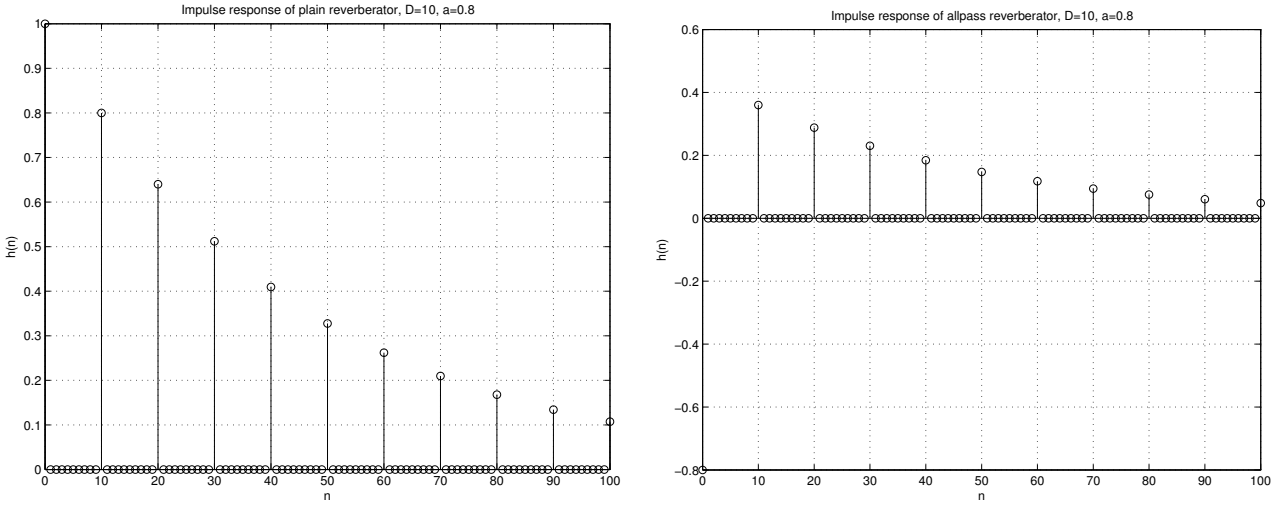
Prob. 1

Impulse response of plain reverberator with $D = 10$ and $a = 0.8$ is shown in Figure 1(a). The response agrees with Figure 8.2.6.

Prob. 2

Impulse response of allpass reverberator with $D = 10$ and $a = 0.8$ is shown in Figure 1(b). The response agrees with equation 8.2.29.



(a) (b)

Figure 1: (a) Impulse response of plain reverberator and (b) impulse response of allpass reverberator.

Prob. 3

Impulse response of Schroeder's reverberator is shown in Figure 2. The response agrees with Figure 8.2.19.

Prob. 5

(a) The length $L = 32$ rectangular window and magnitude response are shown in Figure 3. From the figure we see: the mainlobe height is $L = 32$ which is equal to 30 dB, the mainlobe width is $2\pi/L = 0.196$ rads/sample, the relative sidelobe height is about 13 dB, and the location of the spectral nulls is at $k2\pi/L = 0.196k$.

Prob. 6

(a) The length $L = 32$ Hamming window and magnitude response are shown in Figure 4. From the figure we see: the mainlobe height is $0.54L = 17.28$ which is equal to 24.75 dB, the mainlobe width is $c2\pi/L = 0.39$

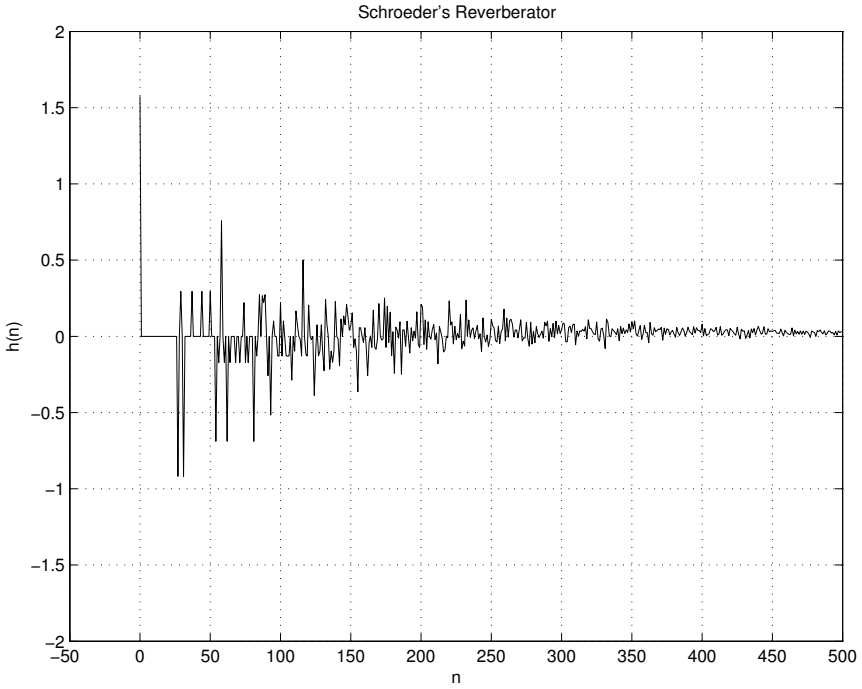
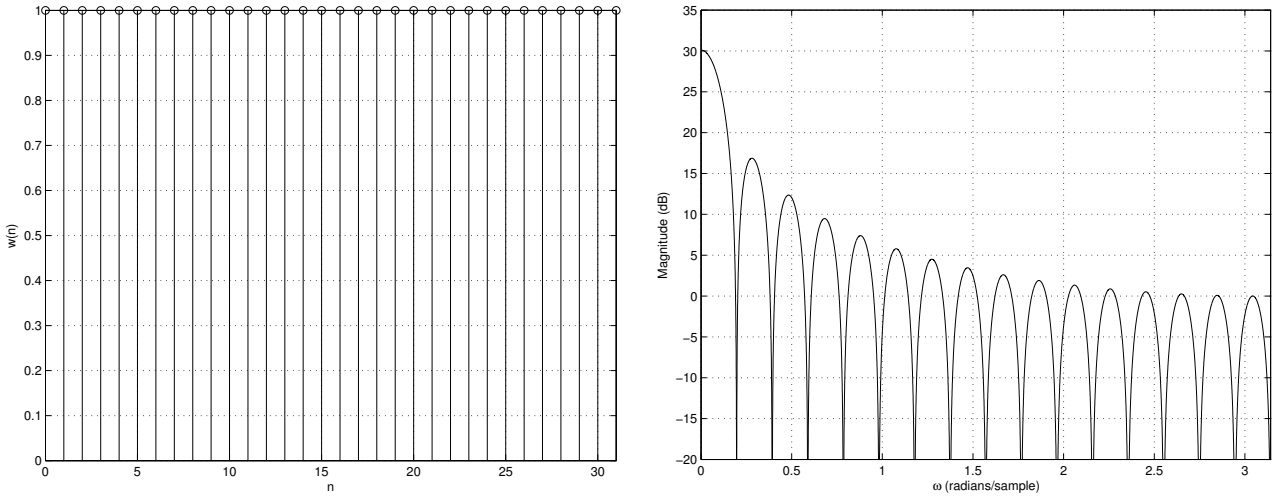


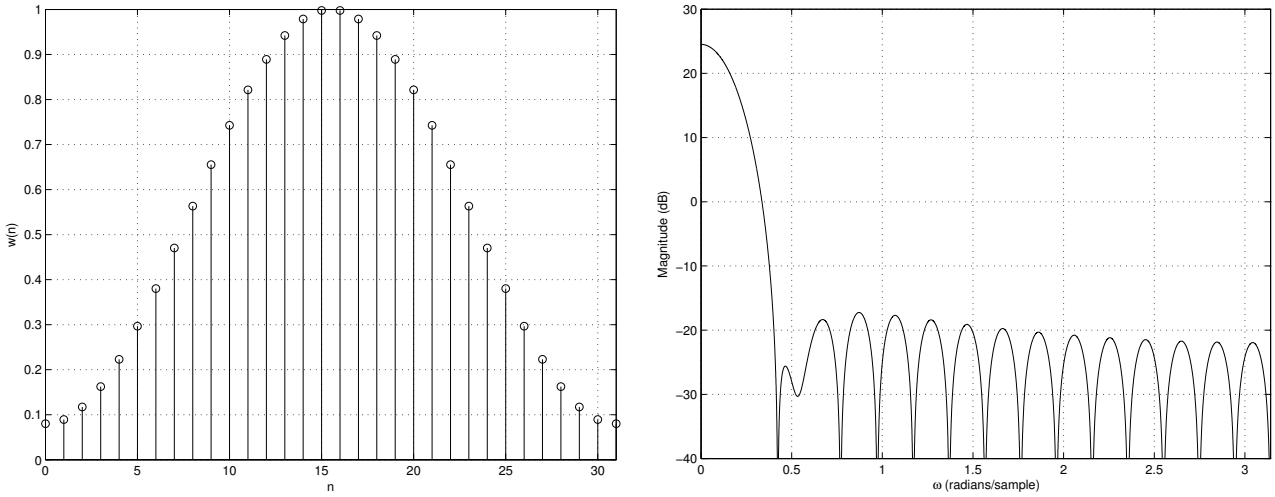
Figure 2: Impulse response of Schroeder's reverberator



(a) (b)

Figure 3: Plots for Prob. 5 (a) rectangular window and (b) magnitude response.

rads/sample ($c \sim 2$), the relative sidelobe height is about 40 dB, and the location of the spectral nulls is at $kc2\pi/L = 0.39k$.



(a) (b)

Figure 4: Plots for Prob. 6 (a) Hamming window and (b) magnitude response.

Prob. 7

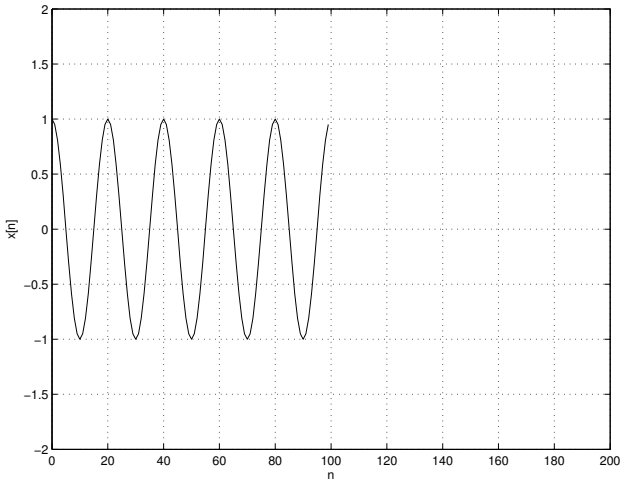
Recreation of plots for Example 9.1.3 can be found in Figure 5.

Prob. 8

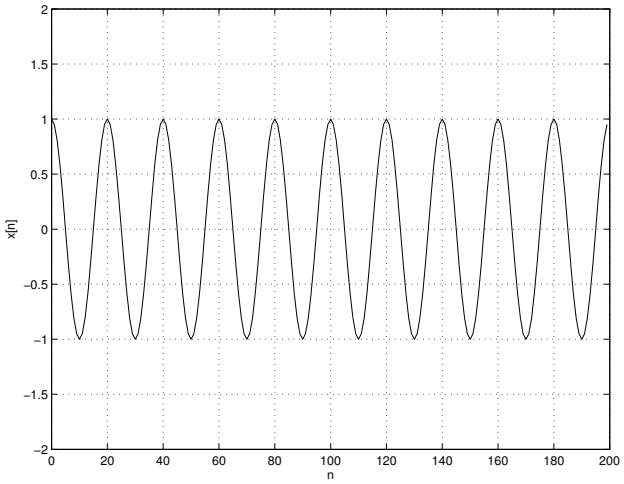
Recreation of plots for Example 9.1.4 can be found in Figure 6.

Prob. 9

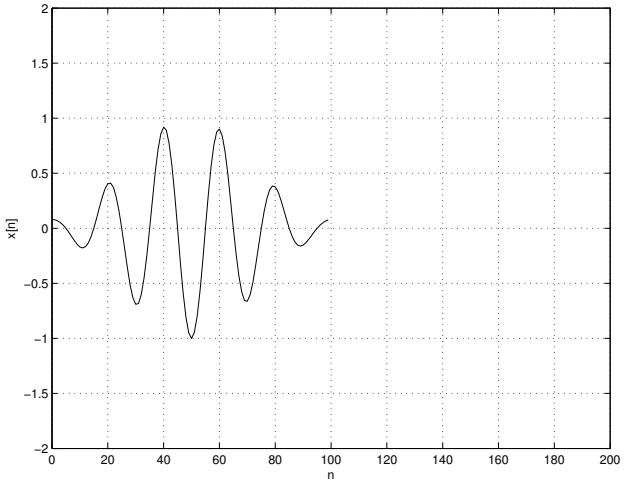
Recreation of plots for first column of Figure 9.3.2 can be found in Figure 7.



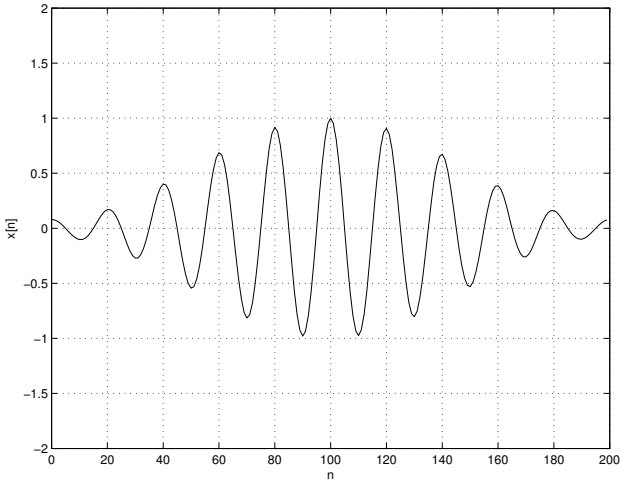
(a)



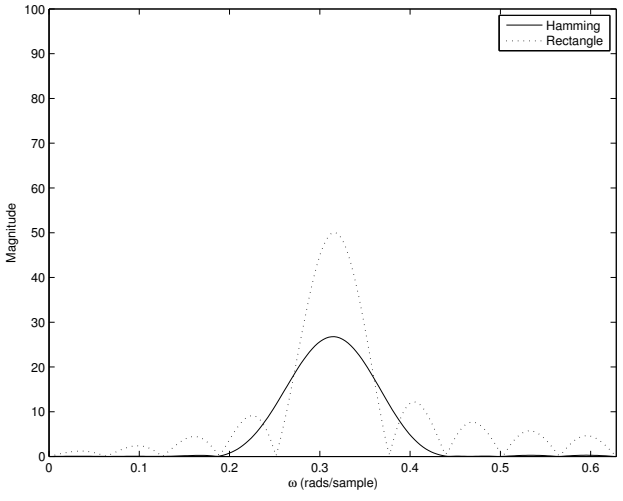
(b)



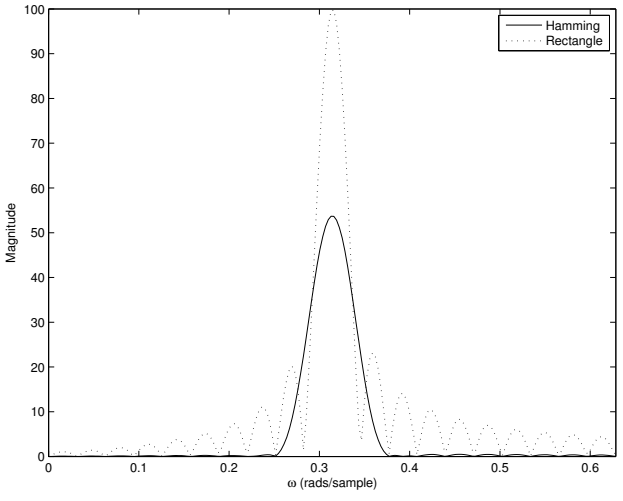
(c)



(d)



(e)



(f)

Figure 5: Plots for Prob. 7 (a) rectangularly windowed sinusoid with $L = 100$, (b) rectangularly windowed sinusoid with $L = 200$, (c) Hamming windowed sinusoid with $L = 100$, (d) Hamming windowed sinusoid with $L = 200$, (e) magnitude spectra for $L = 100$, and (f) magnitude spectra for $L = 200$.

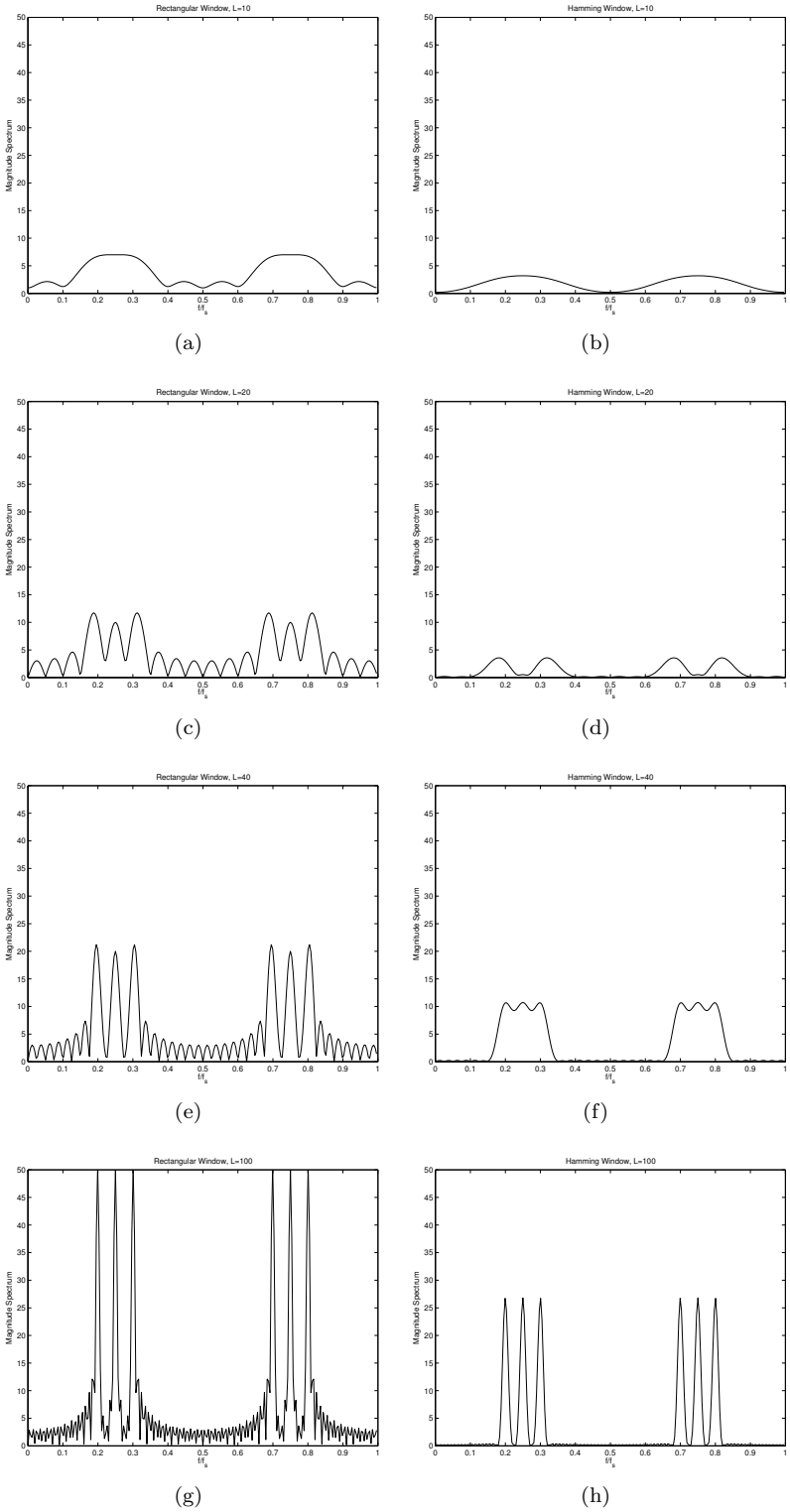
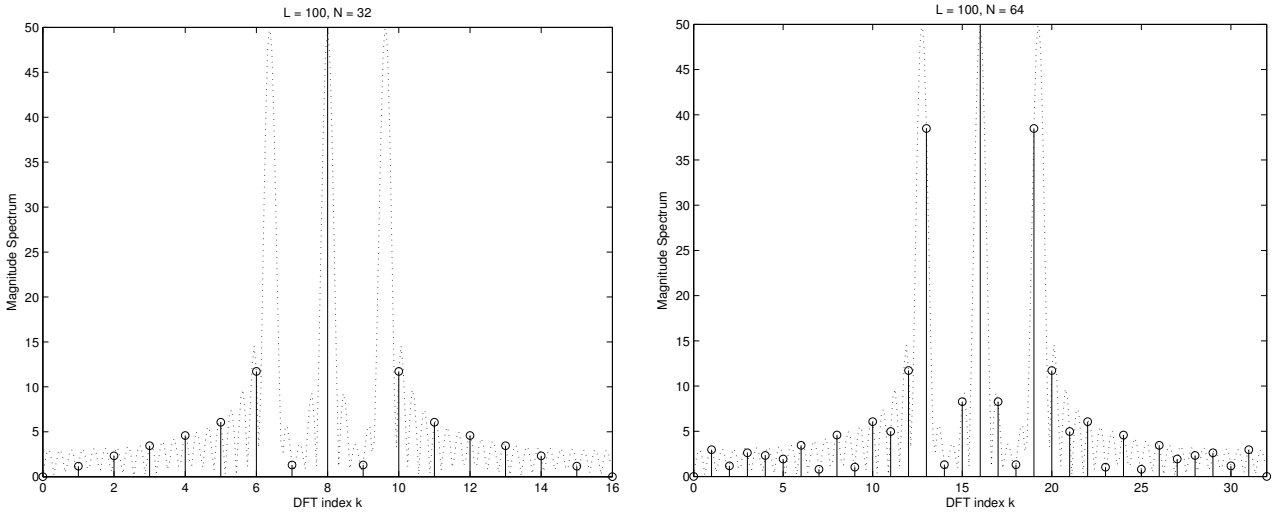


Figure 6: Plots for Prob. 8.



(a) (b)

Figure 7: Plots for Prob. 9.