

### Prob. 1

For the given signal, the sample rate  $f_s = 16000$  Hz with 16 bits per sample. Plots are shown in Fig. 1.

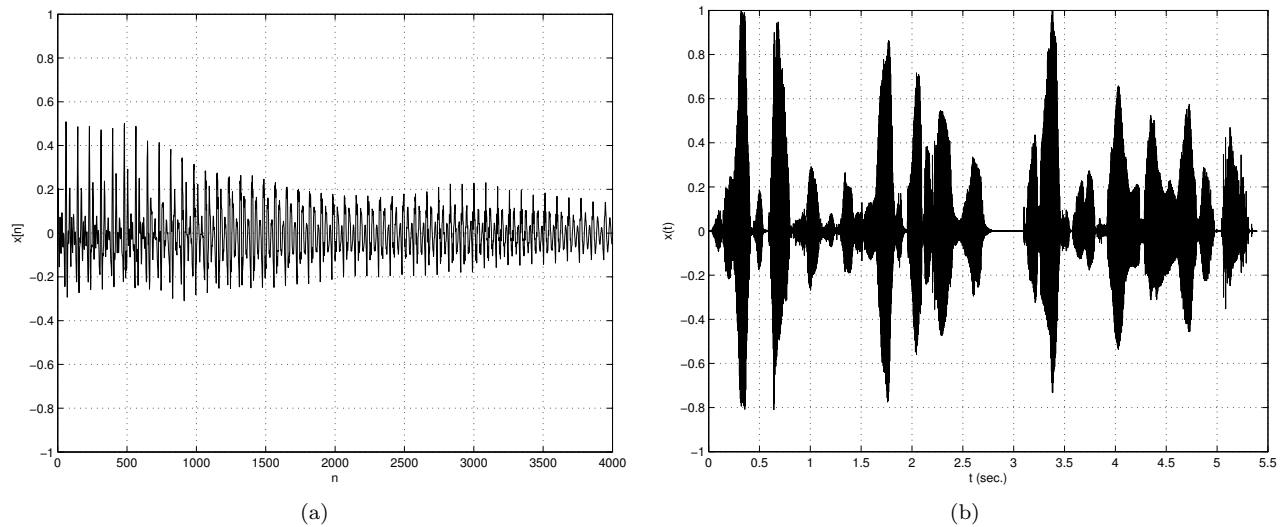


Figure 1: Plots for prob. 1 (a) “oily” segment and (b) entire signal.

### Prob. 2

- (a) Plot is shown in Fig. 2(a). We see since the frequency is  $f + mf_s$  all samples the same.
- (b) Plot is shown in Fig. 2(b). We see since the frequency is not  $f + mf_s$  all samples not the same.

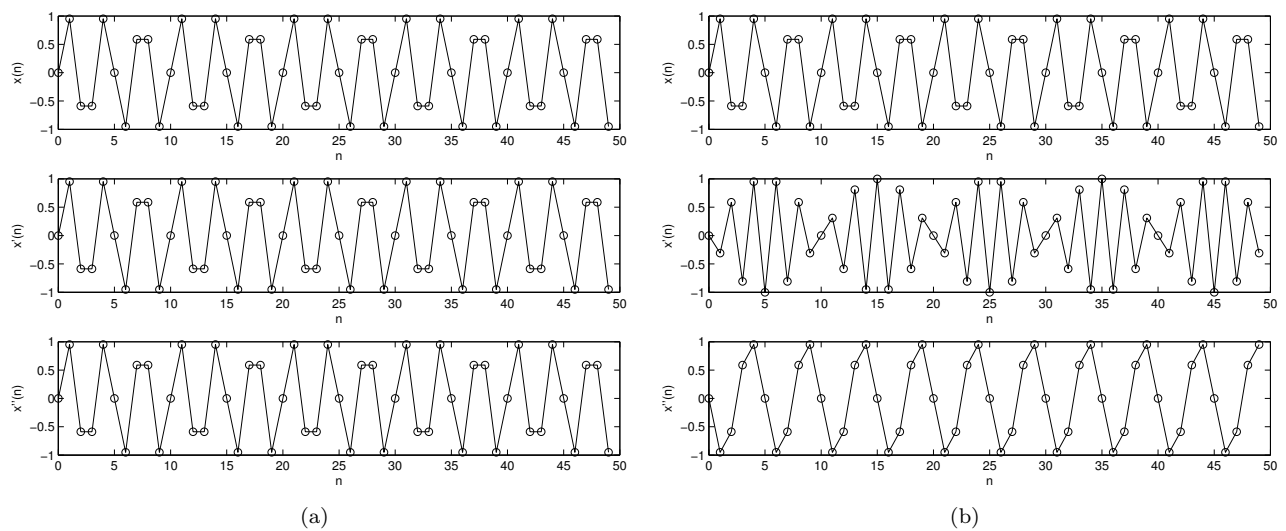


Figure 2: Plots for prob. 2.

### Prob. 3

Plot is shown in Fig. 3. We see since all the frequencies are related as  $f + mf_s$ , all samples the same.

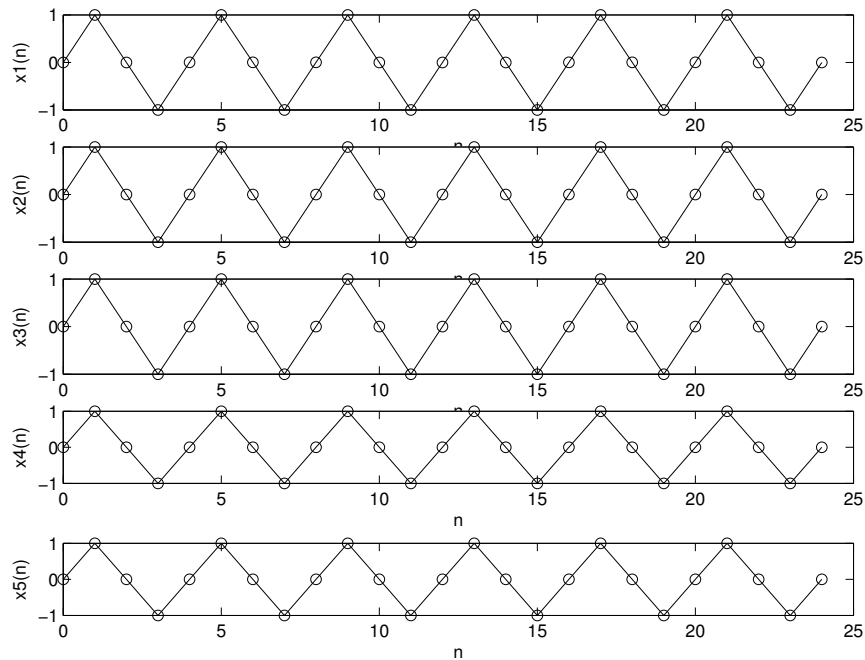


Figure 3: Plot for prob. 3.

### Prob. 4

(a) Plot is shown in Fig. 4(a).

(b) Plot is shown in Fig. 4(b).

(c) In (a)  $f_3$  aliases to  $f_{3a} = -0.5$  kHz and  $f_4$  aliases to  $f_{4a} = 0$  kHz. The aliased frequencies are what is plotted in Fig. 4(b).

(d) With ideal reconstruction, the signal which lies within the Nyquist interval is what gets reconstructed. In this case,  $x_a(t)$  is produced.

### Prob. 5

The historical origin behind CD rate of  $f_s = 44,100$  can be found at

[http://en.wikipedia.org/wiki/44.1\\_kHz](http://en.wikipedia.org/wiki/44.1_kHz)

### Textbook Problems

Solutions to 1.1, 1.4, 1.5, 1.16 may be found in the online solution manual.

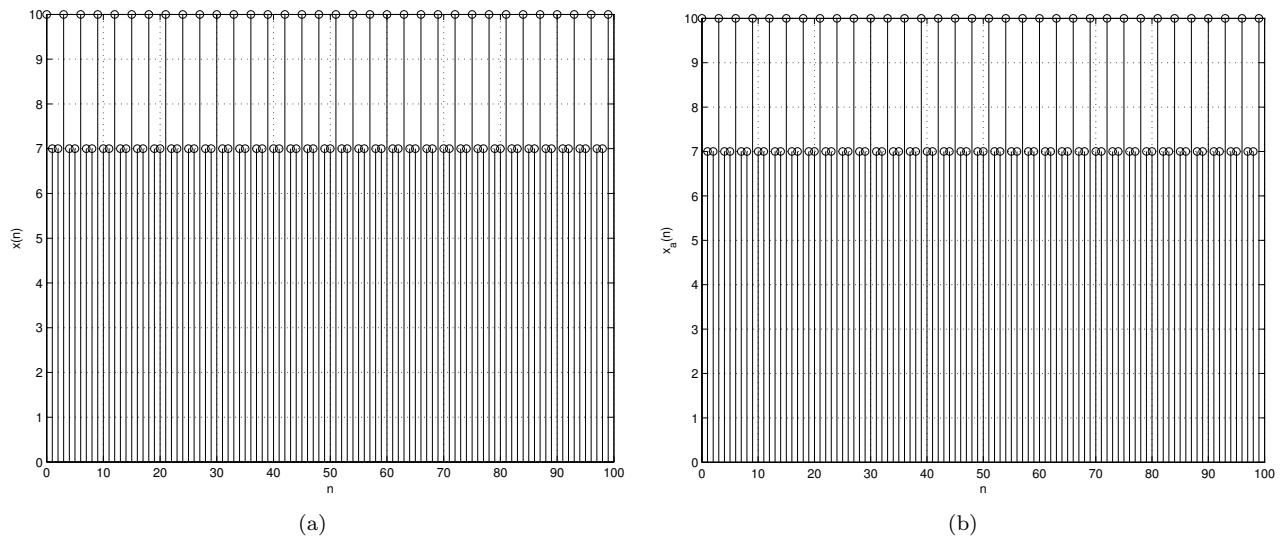


Figure 4: Plots for prob. 4.