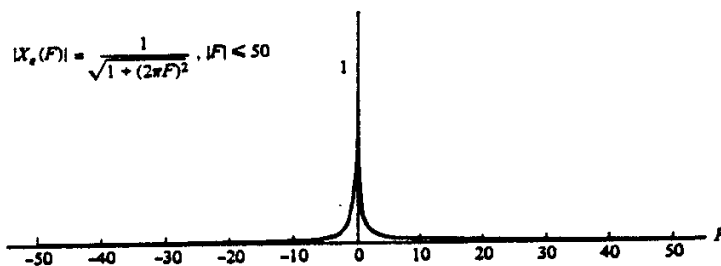
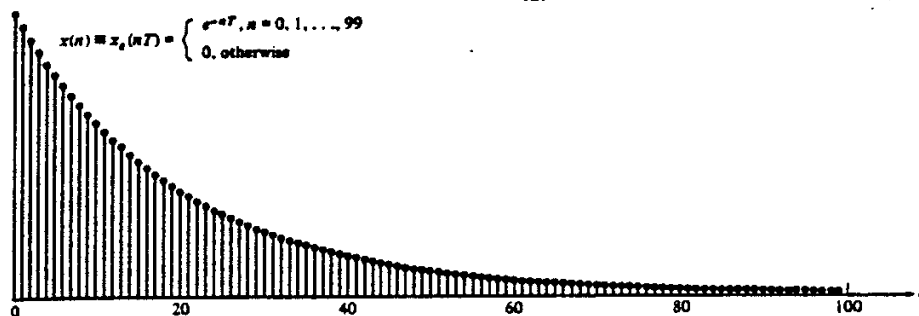


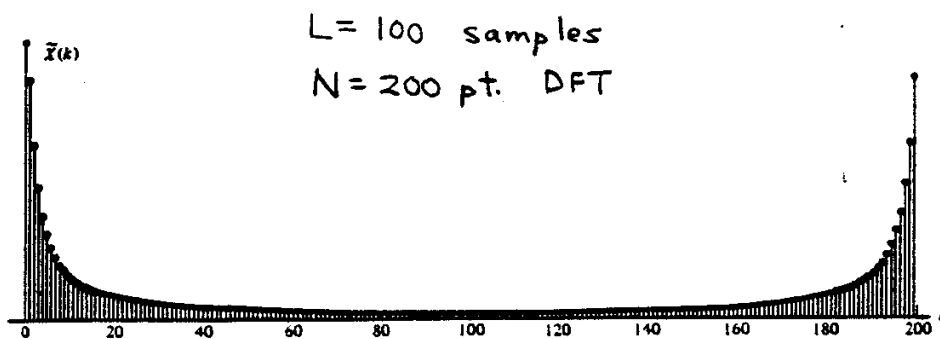
(a)



(b)

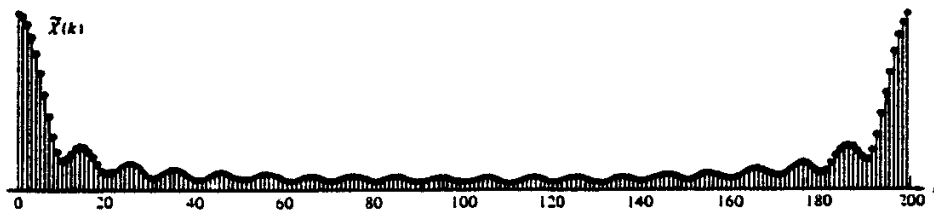


(c)



(d)

$L = 20$ samples
 $N = 200$ pt. DFT



(e)

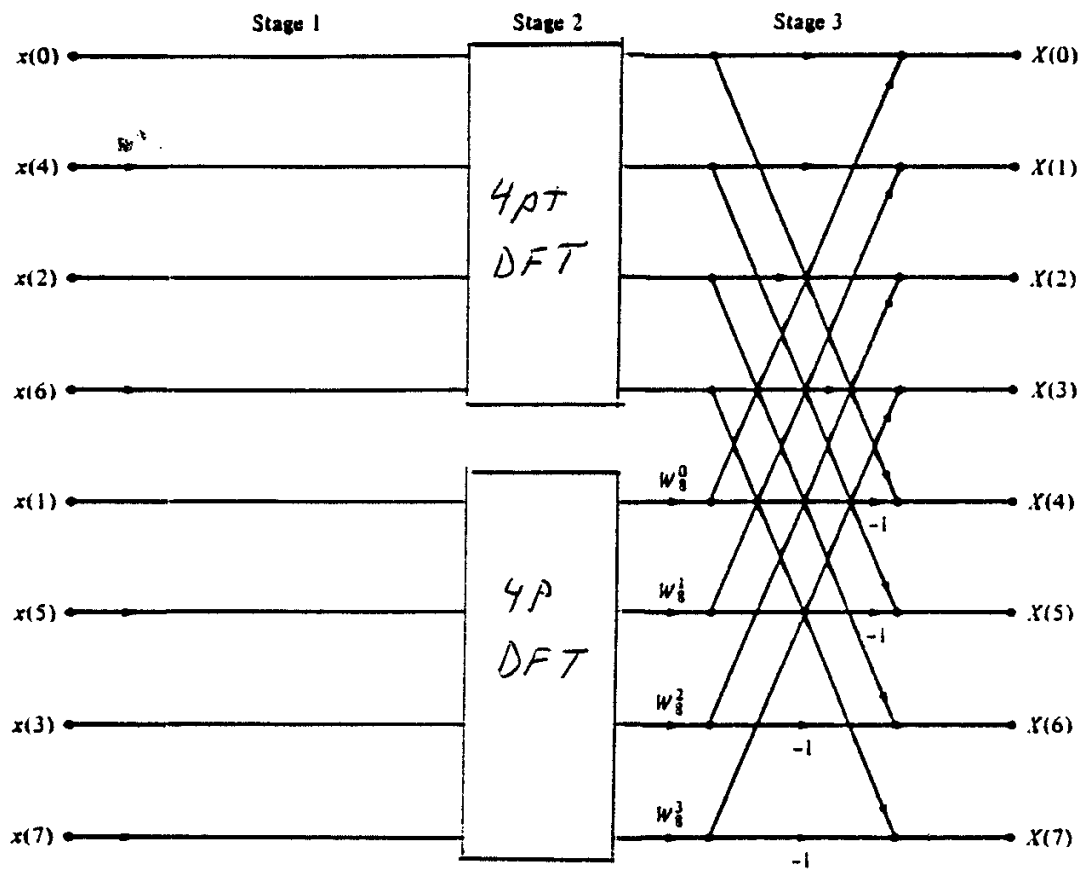
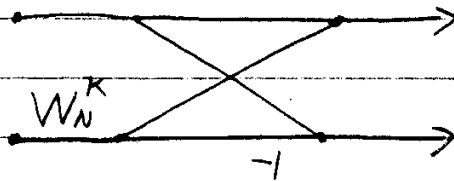


FIGURE 9.12 Eight-point decimation-in-time FFT algorithm.

• Basic Operation (Butterfly)



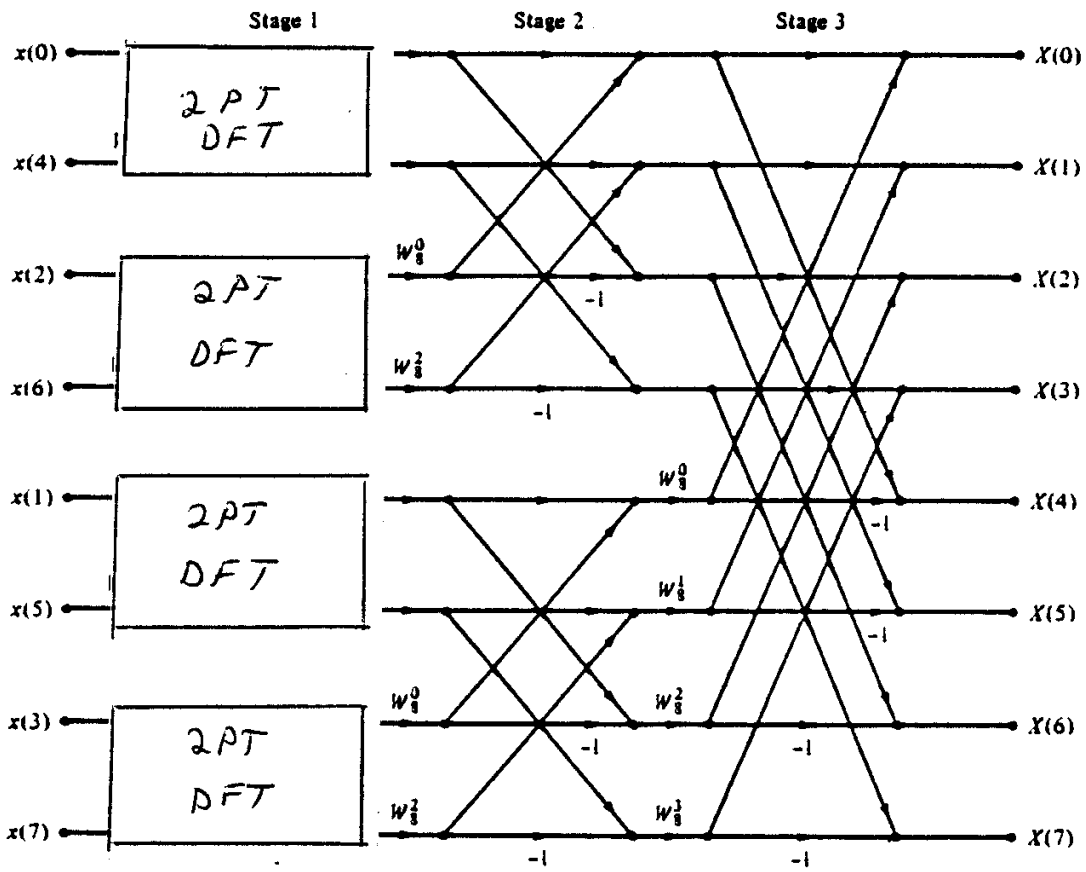


FIGURE 9.12 Eight-point decimation-in-time FFT algorithm.

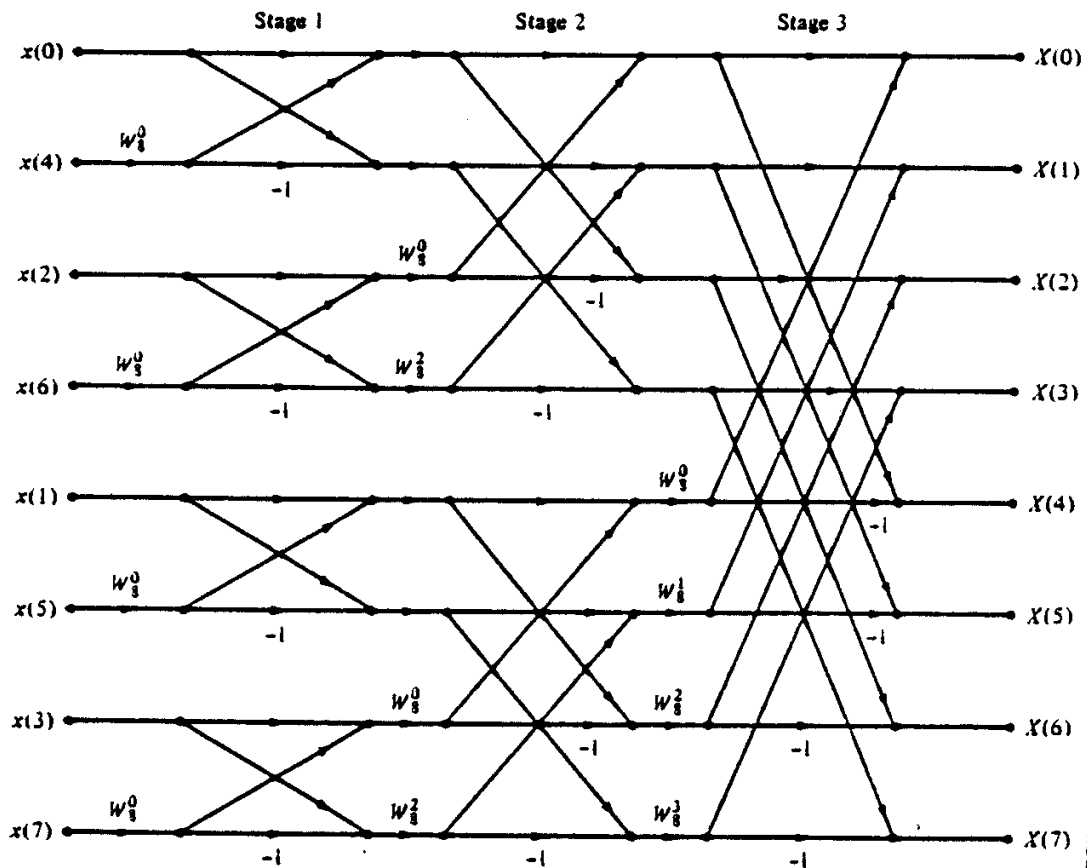


FIGURE 9.12 Eight-point decimation-in-time FFT algorithm.

TABLE 9.3 Comparison of Computational Complexity for the Direct Computation of the DFT versus the FFT Algorithm

Number of Points N	Complex Multiplications in Direct Computation N^2	Complex Multiplications in FFT Algorithm $(N/2) \log_2 N$	Speed Improvement Factor
4	16	4	4.0
8	64	12	5.3
16	256	32	8.0
32	1,024	80	12.8
64	4,096	192	21.3
128	16,384	448	36.6
256	65,536	1,024	64.0
512	262,144	2,304	113.8
1,024	1,048,576	5,120	204.8

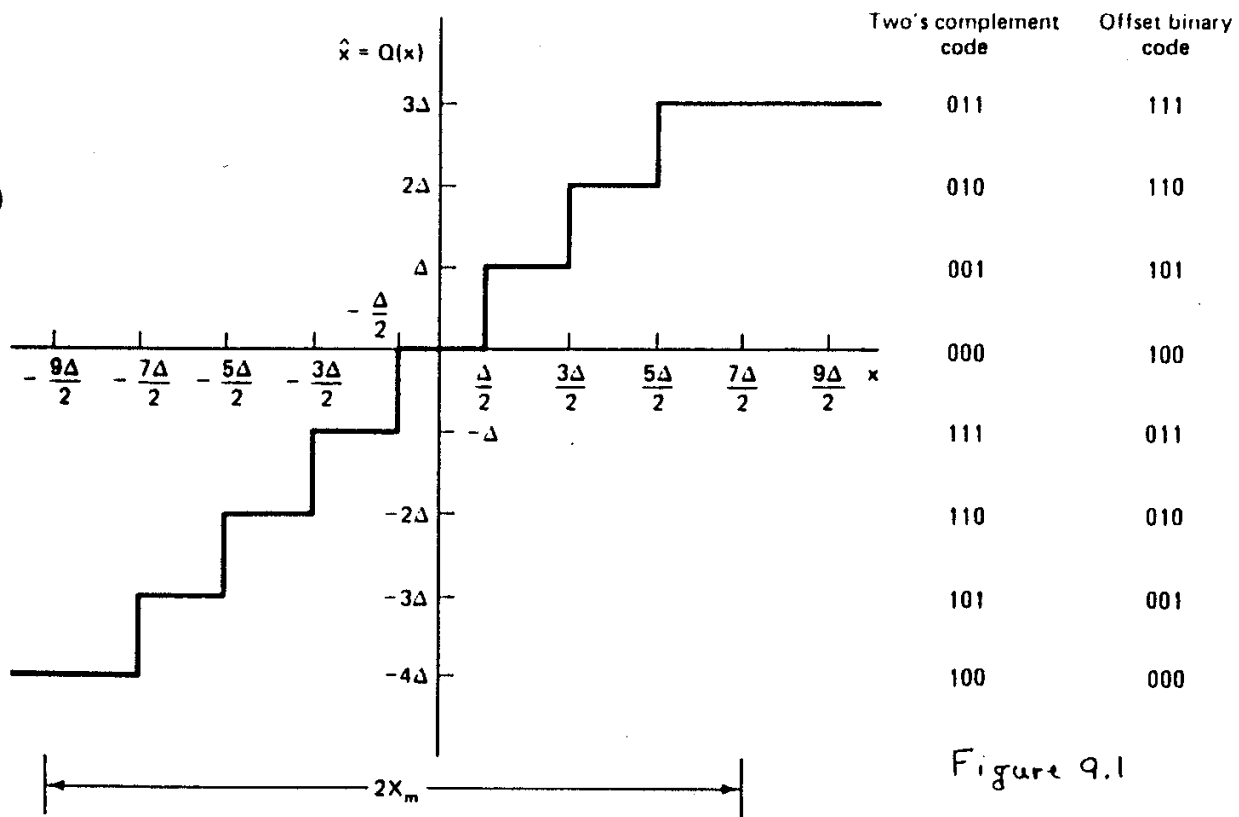


Figure 9.1

Figure 3.31 Typical quantizer for A/D conversion.

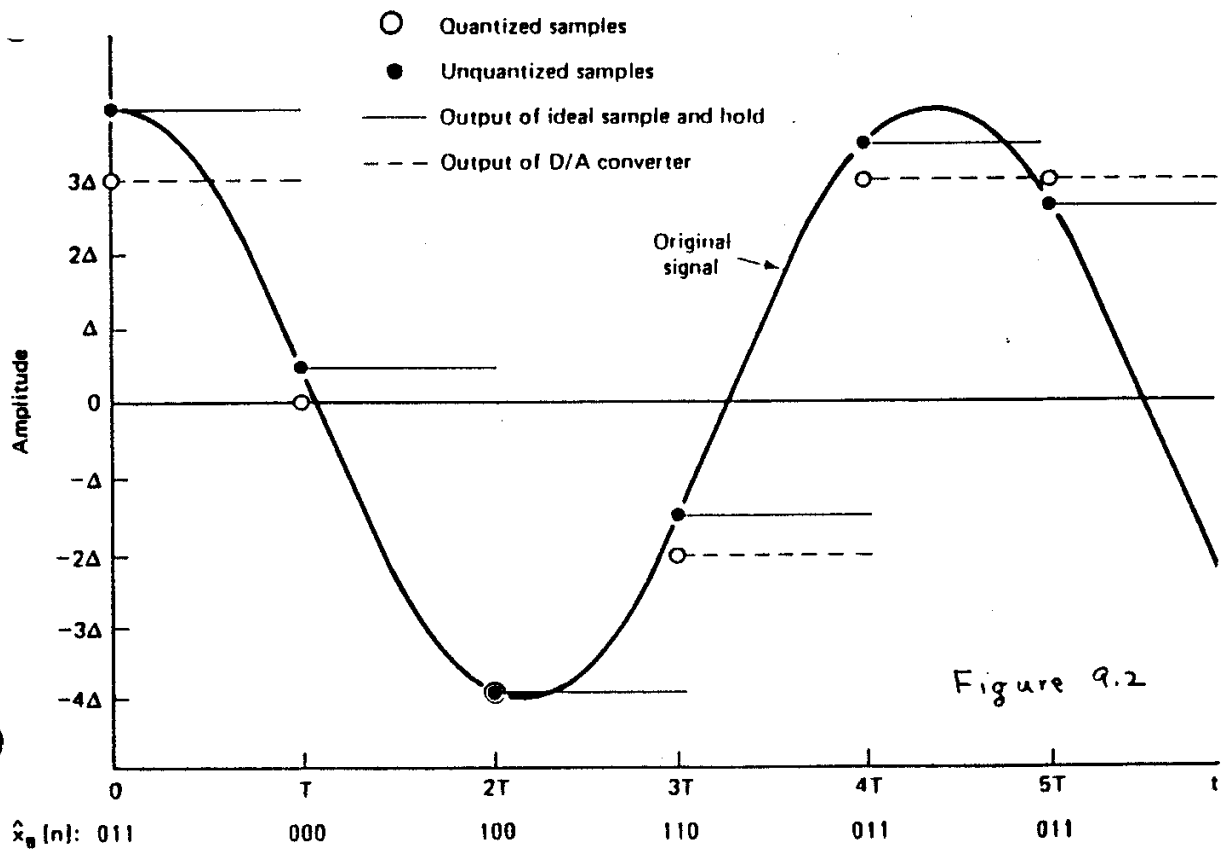


Figure 9.2

Figure 3.32 Sampling, quantization, coding, and D/A conversion with a 3-bit quantizer.

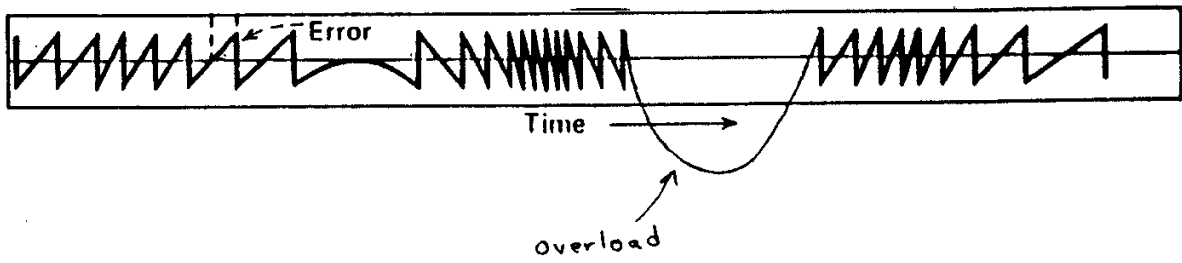
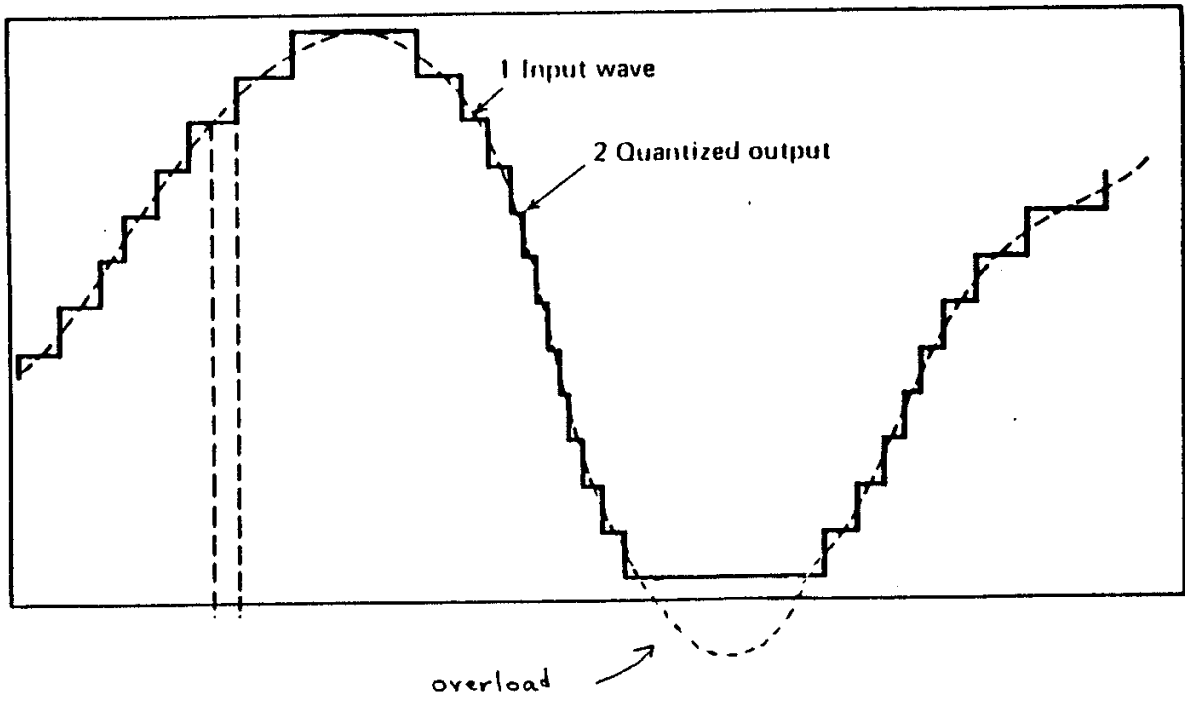


Figure 9.3