Figure 2.1  Graphical representation of a discrete-time signal.

From *Discrete-Time Signal Processing, 2e*  
by Oppenheim, Schafer, and Buck  
Figure 2.2  (a) Segment of a continuous-time speech signal. (b) Sequence of samples obtained from part (a) with $T = 125\, \mu s$. 

From *Discrete-Time Signal Processing, 2e* by Oppenheim, Schafer, and Buck
Figure 2.3  Some basic sequences. The sequences shown play important roles in the analysis and representation of discrete-time signals and systems.
Figure 2.4  Example of a sequence to be represented as a sum of scaled, delayed impulses.
Figure 2.5 \( \cos \omega_0 n \) for several different values of \( \omega_0 \). As \( \omega_0 \) increases from zero toward \( \pi \) (parts a–d), the sequence oscillates more rapidly. As \( \omega_0 \) increases from \( \pi \) to \( 2\pi \) (parts d–a), the oscillations become slower.
Figure 2.6 Representation of a discrete-time system, i.e., a transformation that maps an input sequence $x[n]$ into a unique output sequence $y[n]$.
Figure 2.7  Sequence values involved in computing a causal moving average.
Figure 2.8  Representation of the output of a linear time-invariant system as the superposition of responses to individual samples of the input.
Figure 2.9  Forming the sequence $h[n - k]$. (a) The sequence $h[k]$ as a function of $k$. (b) The sequence $h[-k]$ as a function of $k$. (c) The sequence $h[n - k] = h[-(k - n)]$ as a function of $k$ for $n = 4$. 

From *Discrete-Time Signal Processing, 2e* by Oppenheim, Schafer, and Buck ©1999-2000 Prentice Hall, Inc.
Figure 2.10  Sequence involved in computing a discrete convolution. (a)–(c) The sequences $x[k]$ and $h[n - k]$ as a function of $k$ for different values of $n$. (Only nonzero samples are shown.) (d) Corresponding output sequence as a function of $n$. 

From Discrete-Time Signal Processing, 2e by Oppenheim, Schafer, and Buck ©1999-2000 Prentice Hall, Inc.
Figure 2.12  (a) Parallel combination of linear time-invariant systems. (b) An equivalent system.
Figure 2.13 Equivalent systems found by using the commutative property of convolution.

From *Discrete-Time Signal Processing, 2e* by Oppenheim, Schafer, and Buck
Figure 2.14  An accumulator in cascade with a backward difference. Since the backward difference is the inverse system for the accumulator, the cascade combination is equivalent to the identity system.
One-sample delay

Figure 2.15  Block diagram of a recursive difference equation representing an accumulator.

From *Discrete-Time Signal Processing, 2e*
by Oppenheim, Schafer, and Buck
Figure 2.16  Block diagram of the recursive form of a moving-average system.
Figure 2.17  Ideal lowpass filter showing (a) periodicity of the frequency response and (b) one period of the periodic frequency response.
Figure 2.18  Ideal frequency-selective filters. (a) Highpass filter. (b) Bandstop filter. (c) Bandpass filter. In each case, the frequency response is periodic with period $2\pi$. Only one period is shown.

From *Discrete-Time Signal Processing, 2e* by Oppenheim, Schafer, and Buck
Figure 2.19  (a) Magnitude and (b) phase of the frequency response of the moving-average system for the case $M_1 = 0$ and $M_2 = 4$. 

From *Discrete-Time Signal Processing, 2e* by Oppenheim, Schafer, and Buck ©1999-2000 Prentice Hall, Inc.
Figure 2.20 Illustration of real part of suddenly applied complex exponential input with (a) finite-length impulse response and (b) infinite-length impulse response.
Figure 2.21  Convergence of the Fourier transform. The oscillatory behavior at $\omega = \omega_c$ is often called the Gibbs phenomenon.

From Discrete-Time Signal Processing, 2e by Oppenheim, Schafer, and Buck ©1999-2000 Prentice Hall, Inc.
Figure 2.22  Frequency response for a system with impulse response $h[n] = a^n u[n]$. (a) Real part. $a > 0$; $a = 0.9$ (solid curve) and $a = 0.5$ (dashed curve). (b) Imaginary part.

From Discrete-Time Signal Processing, 2e
by Oppenheim, Schafer, and Buck
Figure 2.22  (Continued) (c) Magnitude. \( a > 0; a = 0.9 \) (solid curve) and \( a = 0.5 \) (dashed curve). (d) Phase.