

**EXERCISE 5.2:** Compute the output y[n] for the length-4 filter whose coefficients are  $\{b_k\} = \{3, -1, 2, 1\}$ . Use the input signal given in Fig. 5-2. Verify that the answers tabulated here are correct, then fill in the missing values.

n	n < 0	0	1	2	3	4	5	6	7	8	n > 8
x[n]	0	2	4	6	4	2	0	0	0	0	0
v[n]	0	6	10	18	?	?	?	8	2	0	0

McClellan, Schafer and Yoder, Signal Processing First, ISBN 0-13-065562-7. Prentice Hall, Upper Saddle River, NJ 07458. © 2003 Pearson Education, Inc.



$$y[n] = 3x[n] - x[n-1] + 2x[n-2] + x[n-3]$$

$$b_0 \quad b_1 \quad b_2 \quad b_3$$

$$y[2] = 3x[2] - x[1] + 2x[0] + x[-1].$$

$$= 3(6) - 4 + 2(2) + 0 = 18$$

$$y[3] = 3x[3] - x[2] + 2x[1] + x[0]$$

$$= 3(4) - 6 + 2(4) + 2 = 16$$

$$y[4] = 3(2) - 4 + 2(6) + 4 = 18$$

$$y[5] = 3(0) - 2 + 2(4) + 6 = 12$$

$$y[6] = 3(0) - 0 + 2(2) + 4 = 8$$