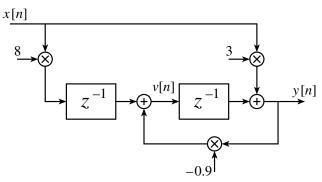


PROBLEM:

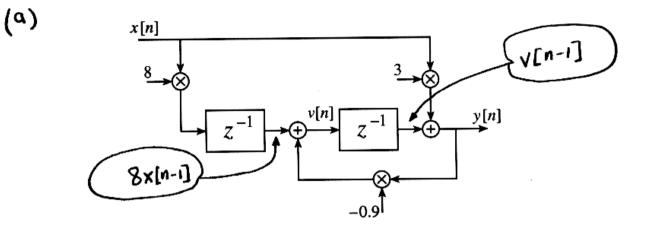
The following signal flow graph structure defines a linear time-invariant system:



- (a) Write the two difference equations defined by the signal flow graph—one for y[n] and one for v[n].
- (b) Determine the *z*-transform system function H(z) from the input x[n] to the output y[n].

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





$$V[n] = -0.9 y[n] + 8x[n-1]$$

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

(b) "Delay" the first equation \$\frac{1}{2}\$ substitute

$$V[n-1] = -0.9 y[n-1] + 8x[n-2]$$

$$y[n] = 3x[n] + (-0.9 y[n-1] + 8x[n-2])$$

$$= -0.9 y[n-1] + 3x[n] + 8x[n-2]$$

Get the filter coefficients to define H(z)

$$H(z) = \frac{3 + 8z^{-2}}{1 + 0.9z^{-1}}$$

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