PROBLEM:

A linear time-invariant system is implemented in MATLAB by the following statement

```
y=filter([1 -2 1],[1 -1.81 .81],x)
```

where x is a vector of input samples.

(a) Write a MATLAB statement for generating necessary input vector x needed to compute samples of the impulse response $h[n]$ of this system for $0 \le n \le 50$.

(b) What is the system function $H(z)$ of the system?

(c) Using unit delays, coefficient multipliers, and adders, draw a block diagram of the system whose system function is as determined in part (b).

SOLUTION

(a) $x = [1, zeros(1, 50)];$

$h = filter([1\ -2\ 1], [1\ -1.81\ .81], x);$

OR

$nn = 0:50;$

$x = (nn == 0);$

(b) $H(z) = \dfrac{1 - 2z^{-1} + z^{-2}}{1 - 1.81z^{-1} + .81z^{-2}}$

Use filter coeffs from b & a vectors

(c) Use Direct Form II