1. Determine the results of the following convolutions.
   (a) \( y[n] = u[n] * u[n] \)

   (b) \( y[n] = x[n] * \delta[n - 2] \) where \( x[n] = (0.2)^n u[n] \)

   (c) \( y[n] = x[n] * h[n] \) where \( x[n] = (0.5)^n u[n] \) and \( h[n] \) is shown in Figure PR-1C.
2. Find the impulse responses for the systems described by the following difference equations. Indicate whether the system is FIR or IIR and whether the system is stable or unstable. Justify your answers. You may assume that the systems are causal.

(a) \[ y[n] = x[n] - \frac{1}{2} x[n-1] \]

(b) \[ y[n] - \frac{1}{2} y[n-1] = x[n] \]
3. Consider the system described by the following difference equation:

\[ y[n] - \frac{1}{4} y[n-2] = x[n] \]

(a) Find the transfer function, \( H(z) \) of this system.

(b) What are the modes of this system?

(c) Is this system stable? Justify your answer.

(d) Find the complete solution if \( x[n] = 3u[n] \) with initial conditions \( y[-1] = y[-2] = 0 \).
4. The transfer function of a certain system is

\[ H(z) = \frac{z^2}{(z - \frac{7}{8})(z + \frac{1}{8})} \]

Find the steady state output of this system to the following input signals.

(a) \( x[n] = u[n] \)

(b) \( x[n] = 15 \left( \frac{1}{4} \right)^n u[n] \)

(c) \( x[n] = \cos(\pi/4 \cdot n) u[n] \)
These grids may be used for graphing signals. You are not required to use them.