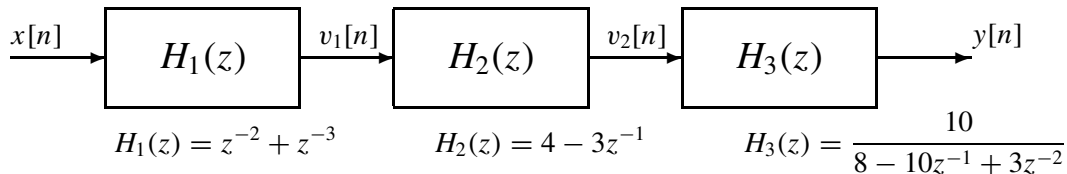


## PROBLEM:

In the following cascade of systems, all of the individual transfer functions are known.



- Find the second output  $v_2[n]$  when the input signal  $x[n]$  is an impulse, i.e.,  $x[n] = \delta[n]$ . Give a general formula in terms of  $\alpha$  and  $\beta$  for  $n \geq 0$ .
- Determine  $H(z)$  the  $z$ -transform of the cascaded system. Simplify  $H(z)$  by factoring the numerator and denominator.
- Consider the impulse response of the cascaded system, i.e., the response  $y[n]$  when the input is  $x[n] = \delta[n]$ . Prove that the impulse response has the form  $h[n] = G \alpha^n$  for  $n \geq 4$ . Find values for  $\alpha$  and  $G$ .