

## PROBLEM:

A linear time-invariant system is described by the difference equation

$$y[n] = x[n] - \beta x[n - 1]$$

(a) When the input to this system is

$$x[n] = \begin{cases} 0 & n < 0 \\ \beta^n & n = 0, 1, 2, 3, 4, 5 \\ 0 & n > 5 \end{cases}$$

Use convolution to compute the values of  $y[n]$ , over the range  $0 \leq n \leq 6$ . Give a general formula in terms of  $\beta$ , and also show that most of the output values are equal to zero.

(b) Use the results from the previous part and plot both  $x[n]$  and  $y[n]$  for the case where  $\beta = \frac{1}{2}$ .