Part I: Questions from the textbook

3.3 Determine the z-transforms and sketch the ROC of the following signals:

(a) $x_1(n)$ is $(1/2)^n$ for $n \geq 0$ and $(1/2)^{-n}$ for $n < 0$.

(c) $x_3(n) = x_1(n+4)$.

3.7 Compute the convolution of the following signals using the z-transform: $x_1(n)$ from question 3.3 and $x_2(n) = (1/2)^n u(n)$.

3.37 Compute the response of the system

$$y(n) = 0.7y(n-1) - 0.12y(n-2) + x(n-1) + x(n-2)$$

to the input $x(n) = nu(n)$. Is the system stable?

3.47 Compute the convolution of the following pair of signals in the time domain and by using the one-sided z-transform.

(b) $x_1(n) = (1/2)^n u(n)$, $x_2(n) = (1/3)^n u(n)$.

(c)* $x_1(n) = \{1, 2, 3, 4\}$ and $x_2(n) = \{4, 3, 2, 1\}$, where I used the underline to denote time zero (instead of the book’s arrow).

*The results of “convolution in the time domain” and “using the one-sided z-transform” may be different. It is fine if you get two different results, because these signals are not one-sided.