**Lab #4**

**Objectives**

* Analyze systems using Z-transform

**Report**

1. Your report must include your answers in hand-written or computer-aid tools.
2. Do not share your report with your friends.
3. Finally, you upload your report to BKeL on time.

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**Z-TRANSFORM EXERCISES**

For each discrete-time signal x(n), find the corresponding Z-Transfrom and its ROC

**Exercise 1.**

**Exercise 2.**

**Exercise 3.**

**ADDITIONAL SCILAB EXERCISES**

**Exercise 4.**

Investigate the existing library or toolbox in Scilab to process audio data.

**Exercise 5.**

Investigate the existing library or or toolbox in Scilab for image processing. Then, you can do an example or a demo to show a simple manipulation (e.g., Histogram display, histogram equalization, blur, and watermarking) on a digital image.

**Exercise 6.**

Let there are two discrete signals , defined over the entire range of n. Then the linear convolution of discrete signals is of the form .

* Deprive the signal such that converges in the following cases.
  + Both and are causal.
  + The system has a finite impulse response such that .
* Suppose the second case is hold, compute the convolution of and using “folding and shifting” method. Implement your answer with Scilab script.
* Suppose the second case is hold, compute the convolution of and using matrix method. Implement your answer with Scilab script.
* Drawing , and energy of discrete signals in the same figure.

**Exercise 7.**

For a periodic signal of length N and impulse response of length M, the circular convolution between and is defined as . Explain why can be deprived that way.

* Compute the convolution of and using “folding and shifting” method. Implement your answer with Scilab script.
* Compute the convolution of and using matrix method. Implement your answer with Scilab script.
* Drawing , and energy of discrete signals in the same figure.

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