VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITY
UNIVERSITY OF TECHNOLOGY
FACULTY OF COMPUTER SCIENCE AND ENGINEERING

DIGITAL SIGNAL PROCESSING

Report #07

Lab 07 : Z - Transform

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1 Z-TRANSFORM EXERCISE

1.1 Exercise 1

$x(n) = 2\delta(n+2) - 1\delta(n+1) + 2\delta(n) - 3\delta(n-1) + 4\delta(n-2)$
Cuz: $\delta(n-k) \rightarrow \delta(z) = z^{-k}$
$\Rightarrow X(z)2z^2 - z + 2 - 3z^{-1} + 4z^{-2}$
ROC: $z \neq 0 \cup z \neq \pm\infty$

1.2 Exercise 2

$x(n) = 0,5^n u(n) + 0,4^n u(n)$
Cuz: $a^n u(n) \rightarrow X(z) = \frac{1}{1-az^{-1}}$
$\Rightarrow X(z) = \frac{1}{1-0,5z^{-1}} + \frac{1}{1-0,4z^{-1}}$
ROC: $\mid z \mid > 0,5$

1.3 Exercise 3

$x(n) = 0,5^n u(n) + 0,4^n u(-n-1)$
Cuz: $a^n u(n) \rightarrow X(z) = \frac{1}{1-az^{-1}}$
$- a^n u(-n-1) \rightarrow X(z) = \frac{1}{1-az^{-1}}$
$\Rightarrow X(z) = \frac{1}{1-0,5z^{-1}} - \frac{1}{1-0,4z^{-1}}$
ROC: $Z \in \phi$

2 Additional Scilab Exercises

```
clc;
clear;
clf;
a = gca();
a.x_location = "origin";
a.y_location = "origin";
z = poly(0, 'x');
xn = 2.2403 + 2.4908*z.^(-1) + 2.2403*z.^(-2);
yn = 1 - 0.4*z.^(-1) + 0.75*z.^(-2);
hn = xn./yn;
im_rep = flts(eye(1,20), tf2ss(hn));
plot2d3(im_rep);
```