**Signals & Systems MATLAB 4 Report**

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#以下圖中函數名稱取為x[n]<->X(z).

1. We can use convolution to express the product of polynomials. For example, to express

,

We construct two coefficient matrices: M1= [1 -1], M2= [1 1], and get the matrix of the f(z) by convolving M1 and M2.

In problem 1, I use ***conv*** to get the dominator and denominator, and use ***residuez*** to get **r, p, k** array as follow.



To get inverse z-transformed, we use the z-transformed pair



Therefore,

****(m: number of poles)

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1. Using ***zplane*** to plot poles and zeros.

Zeros: 1, 1, -1, -1

Poles: -0.3573-0.5889i, -0.3573+0.5889i, -0.7686-0.3338i, -0.7686+0.3338i

Due to the casual system, the ROC is an outer circle with the radius equal to the outmost pole.

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1. Analyze the magnitude response of H(z) by ***freqz.***

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1. Find a representation of this transfer function as a cascade of two second-order sections with real coefficients.

Ans: 

1. Evaluate and plot the magnitude response of each section in 4.

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1. Determine the impulse response of the system by obtaining the output for an input x[n]=δ[n], and compare it with the result of 1.

Ans: By comparing the two, we could find that they are the same.

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