



### **Lab 6: Study on z-transform**

#### **Objectives:**

1. To understand the frequency response.
2. To understand the poles and zeros of a system.
3. To understand the system stability.

#### **MATLAB function for frequency response:**

- ◆ MATLAB provides a function called *freqz* to compute the system function  $H(z)$ .
  - $[H, \omega] = \text{freqz}(b, a, N)$  ◇ returns the N-points frequency vector  $\omega$  and the N-points complex frequency response vector  $H$  of the system, given its numerator and denominator coefficients in vector  $b$  and  $a$ .
  - $[H, \omega] = \text{freqz}(b, a, N, \text{'whole'})$  ◇ uses N points around the whole unit circle for computation.
  - $[H, \omega] = \text{freqz}(b, a, N)$  ◇ returns the frequency response at frequencies designated in vector  $\omega$ , normally between 0 and  $\pi$ .

#### **MATLAB function for frequency response:**

- *zplane* (b,a) function is used for pole-zero plot.

#### **Labwork:**

1. Given that  $y(n) = 0.9y(n-1) + x(n)$ . Determine the frequency response,  $H(z)$  and plot the magnitude and phase angle of  $H(z)$ . Also sketch the pole-zero plot of  $H(z)$ .

#### **Lab Assignment-6**

1. Develop a MATLAB function to perform the frequency response of a signal.