

MAT 202

Problem Set 2

1. Consider two finite length sequences

$$x[n] = \{1, 3, -2, 1, 2, -1, 4, 4, 2\}$$

$$y[n] = \{2, -1, 4, 1, -2, 3\}$$

Use MATLAB to obtain the convolution and cross-correlation of $x[n]$ and $y[n]$.

2. Use MATLAB to obtain and plot the poles and zeros of the following z-transform

$$H(z) = \frac{2z^4 + 16z^3 + 44z^2 + 56z + 32}{3z^4 + 3z^3 - 15z^2 + 18z - 12}$$

3. Consider the complex number

$$z_1 = 3 + 4j$$

$$z_2 = -3 - 2j$$

Use MATLAB to do the following

a) Express z_1 and z_2 in polar form

b) Calculate

$$w_1 = z_1 + z_2$$

$$w_2 = z_1 - z_2$$

$$w_3 = z_1 * z_2$$

$$w_4 = \frac{z_1}{z_2}$$

c) Plot $z_1, z_2, w_1, w_2, w_3, w_4$

4. Write the z-transforms $X(z)$ and $Y(z)$ corresponding to $x[n]$ and $y[n]$ in Problem 1.

Calculate $W(z) = X(z)Y(z)$

What is the relation between $W(z)$ and the convolution of $x[n]$ and $y[n]$ obtained in Problem 1.