

# Homework 12

## EE 324: Signals and Systems II

### 1 Root locus

Plot the root locus of the following systems. Determine the range of  $K \geq 0$  such that the corresponding closed loop system is stable.

1)  $L(s) = \frac{K(s+2)}{(s+1)(s+3)}$

2)  $L(s) = \frac{K(s+1)}{(s-1)(s+2)}$

3)  $L(s) = \frac{K(s+2)}{(s-1)(s+2)}$

4)  $L(s) = \frac{K}{s(s^2+s+2)}$

5)  $L(s) = \frac{K}{(s+2)^2(s+1)}$

6)  $L(s) = \frac{K}{(s+1)^3}$

7)  $L(s) = \frac{K(s^2+4s+5)}{s(s+1)(s+2)}$

### 2 Nyquist plot

Use Nyquist criteria to determine the stability of the corresponding closed loop systems

1)  $L(s) = \frac{1}{s+1}$

2)  $L(s) = \frac{1}{(s+1)^3}$

3)  $L(s) = \frac{10(s+1)}{s^2-4}$

4)  $L(s) = \frac{(s+3)}{s(s+1)(s-2)}$