

# Home Work #4

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## 1 Question 1

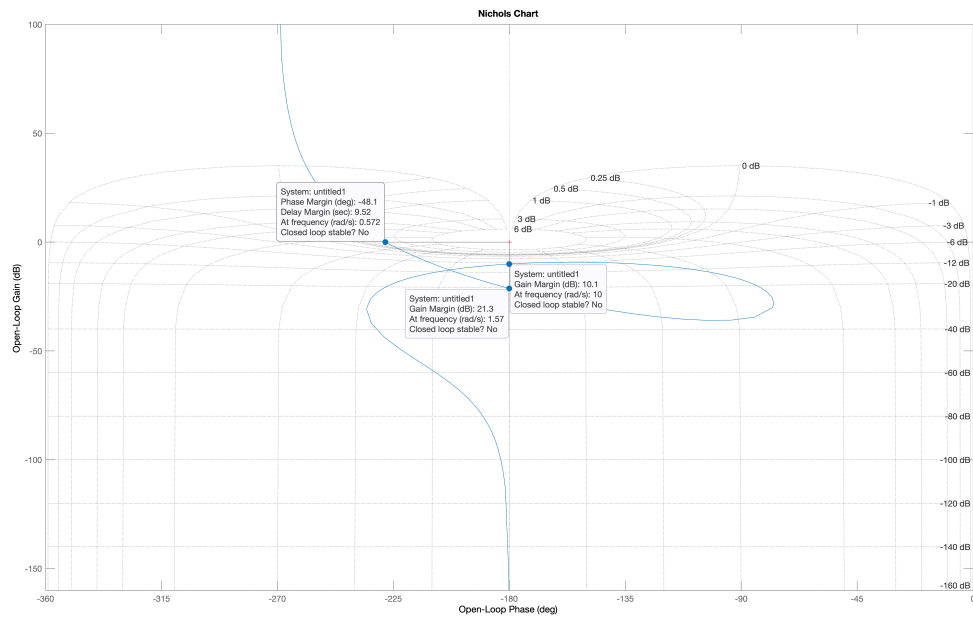
System:

$$G(s) = \frac{(s+1)(s+4)(s+8)}{s^3(s^2+0.2s+100)}$$

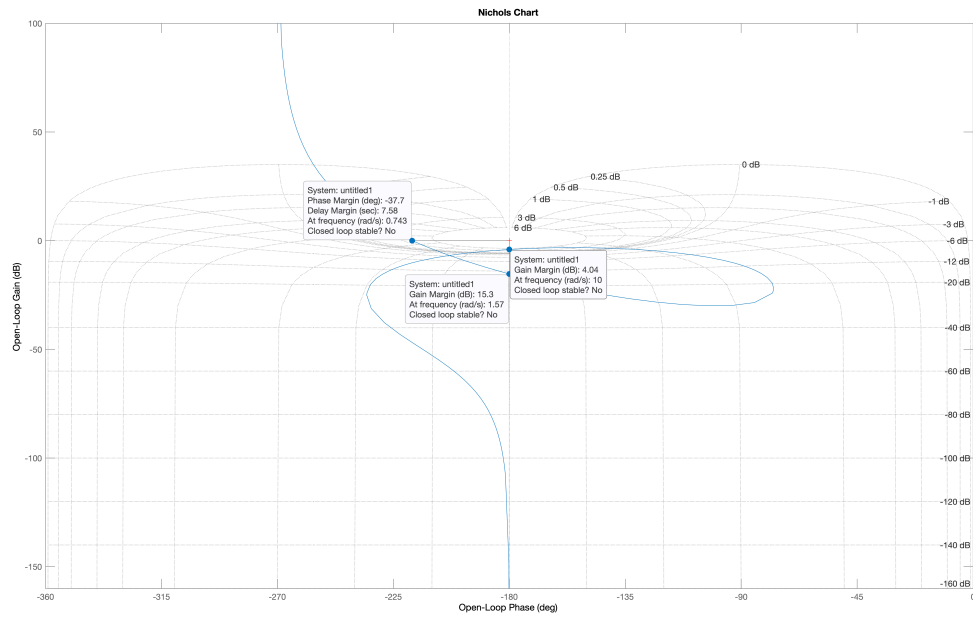
### 1.1 part a

- $K = 0.5$

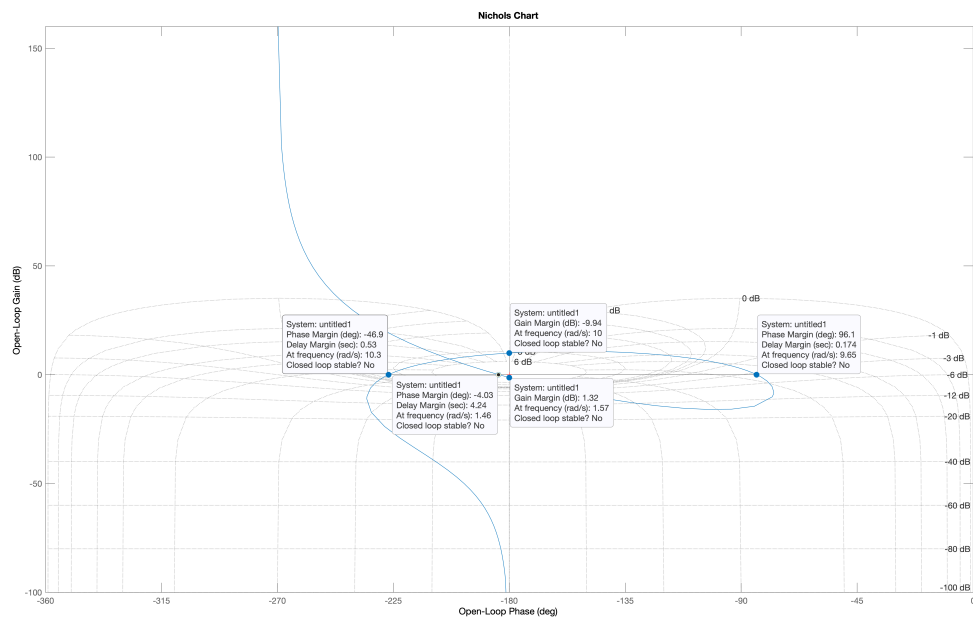
Figure 1: Nichols chart for  $KG$ , ( $K = 0.5$ )



- $K = 1$

Figure 2: Nichols chart for  $KG, (K = 1)$ 

- $K = 5$

Figure 3: Nichols chart for  $KG, (K = 5)$ 

Phase margin and gain margin are shown in above figures and all closed loop systems are unstable with  $K$  form 1 to 5. In all of them phase margin is negative.

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