**ECE 311 - Lab 3**

*Name Surname*

DD/MM/YYYY

**1 - INTRODUCTION**

In this section, you will summarize the main purpose of this lab and briefly describe the experiments you performed.

**2 - EXPERIMENTS**

In this section you will report all your experimental simulation: discuss your hypothesis and results.

**2.1 CONTROLLER DESIGN USING MATLAB**

In this section you will describe all the steps performed to design your controller using the root locus method with MATLAB.

Be sure to include the following material and discussions:

1. Your first root locus plot with the initial choice of *TI =1.* Why there doesn’t exist K > 0 such that the closed-loop has two poles on the real axis with real part ≤ −20? Justify your answer using the root locus plot.
2. Your final choice of TI and the corresponding root locus plot.
3. The values of *K* you obtained using the function **rlocfind.**
4. Report the response of the closed loop system with the PI controller. What is the settling time *Ts* you estimated from your plot? Is the control specification **approximately** met?
5. Is SPEC5 met? Include the plot of your voltage input to support your claim

***More aggressive controller »***

1. Report here the value of *TI* such that there exists K > 0 such that the closed-loop system has two poles close to s = − 30 and the corresponding root locus plot.
2. Your final choice of TI and the corresponding root locus plot.
3. The values of *K* you obtained using the function **rlocfind**
4. Report the response of the closed loop system with the new PI controller. What is the settling time *Ts* you estimated from your plot? Is the control specification **approximately** met?
5. Is SPEC5 met? Include the plot of your voltage input to support your claim

**2.2 REJECTION OF DISTURBANCES**

Be sure to include the following material and discussions:

1. Include the closed loop responses for both controllers
2. Are the two controllers able to reject the disturbance?
3. How the two controllers compare, with respect to disturbance rejection? Support your arguments referring to the velocity responses you obtained.

**3 - CONCLUSIONS**

In this section you need to answer the following questions:

1. How do the settling times and overshoots compare?
2. Which controller is best suited to meet the specs?
3. What is the cause of the differences you observe?
4. Are both controllers able to reject the disturbances?