EE380 (Control Systems) Lab work of Experiment 2.

Student Name	Roll No.	Bench No.

Q9 See manual to implement this part. Show results to TA before you proceed further.

TAs: Is the pulley turning clockwise and counter-clockwise directions with almost zero creep towards any one direction? Is the student's plot generated by `readplot.m` showing a 18 V peak-to-peak triangular waveform?

Q10 Identify the system parameters using least squares estimation.

Use `readSID.m` for the identification using the input-output data from the motor. Populate the following tables.

Type of TF	TF	Parameters of step response	
		$\omega(\infty)$ [rad/s]	Sketch of step responses
TF from Exp-t 1			
TF from triangle with filter in `readSID.m`			
TF from triangle with filter in `readSID.m`			

Q11 Approximately fit a first order TF to the unit step response of the TF corresponding to the triangle (8 V ampl, with filter[1] in `readSID.m`) in Q10, similar to how you did in Q8 of Experiment 1.

Q12 With the first order TF in Q11, redesign your controller using loop-shaping for the motor to track sinusoids upto 5 rad/s with $e_{ss} \leq 10\%$. *Hint: You do not need a semilog graph paper here.*

[1] We could have as well done this experiment on the "without filter" result from Q10.

Q13 Program the discretized version of the controller from Q10 into the dsPIC, run the setup, if necessary, very slightly adjust the offset knob of the FG so that there is no net creep of the pulley in any one direction, and populate the following table.

In `main-prog.c`, you will need to comment out the part `u = 9.0/511*AD_value();`, write your controller in the appropriate place, and uncomment the two lines

```
R = AD_value(); // In signed mode, ADC maps [0,5] V to [-511,+511].
R = 100.0*R/511; // R = 100*sin(w_in*t) rad/sec; 100 is max speed.
```

that correspond to this experiment.

Frequency of sinusoid of magnitude 10 rad/s [Hz]	0.5	1
Amplitude of output ω of CL system [rad/s] (in experiment)		
Amplitude of control u [V] (in experiment)		

Q14 Conclusions: What is the largest frequency sinusoid that this CL system is able to track? What is limiting this frequency?