ENGR 121 – Temperature Control System Evaluation

Student Names: _____

Note: *You may test your system in classes 11 and 12. If you team experiences problems and is unable to finish testing in class 12, you may test in class 13 for 80% of the possible points and in class 14 for 60% of the possible points.*

1. Fill in the table below prior to the day of testing (10%):

Thermistor calibration equation (temperature in terms of analog value)	
Thermistor calibration equation (analog value in terms of temperature)	
3 x standard deviation of random error (analog value)	

quantity	**Temperature (°C)**	**analog output**
UCL		
setpoint	25	
LCL		

2. Instructor Inspection of System and LCD (15%):

Your LCD should be formatted as shown below. The information on the first three lines of the LCD should never change (unless your instructor changes the setpoints).

- First Line: team name centered on the screen
- Second Line: Headings of LCL, SP, and UCL
- Third Line: LCL value, setpoint value and UCL value. All temperatures displayed should be in degrees Celsius with the LCL and UCL containing one decimal place.
- Fourth Line: Display the current temperature and the status of the heater (on or off)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
0							T	E	A	M	N	A	M	E						
1			L	C	L					S	P				U	C	L			
2			2	4	.	2				2	5				2	5	.	9		
3	T	E	M	P	=	2	3	.	7		H	E	A	T	E	R	=	O	N	

Item	(Y or N)	Comment
LCD is configured as shown (10%)		
LCD responds in a prompt and steady fashion. That is, the display doesn't flicker, temperature values change correctly, heater status changes cleanly to on or off. (5%)		

3. Instructor Testing of System (55%):

1. Instructor will inject DI water into your tank, decreasing temperature below LCL values.
2. Instructor will observe system behavior.

Item	(Y or N)	Comment
Temperature on the LCD decreases (15%)		
Heater comes on when temp is below LCL (20%)		
Heater goes off when temp exceeds UCL (20%)		

Observations. If part of your system is not working correctly, please use the space below to describe the problem and how you think the problem can be solved.

4. **(5%)** Attach a spreadsheet that includes the 20 data points collected when determining the random error in temperature. Show the standard deviation σ as well as the value of 3σ (the distance between the setpoint and the control limits.

5. **(5%)** Attach the data that you used to calibrate your temperature sensor as well a plot showing the trendline and equation (analog input vs. temperature). Also invert this equation showing how temperature is computed from the analog input.

6. **Quality of Sketch (10%):** Attach a listing of your sketch. You may change your sketch if needed when you are preparing your system for testing during class to improve system function. However, you will be graded based on the sketch submitted.