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Lab 5 Summary

1. Conclusions/Observations – We could properly achieve equilibrium by increasing or decreasing the motor speed based on the difference of the current water level from equilibrium. We could run this at any valve opening or any pump voltage to get the same desired result. One observation that we noticed though was that the pumps were various models. So, some pumps we were unable to run the valve fully opened while others we could.

After adding in our PID control we were able to adjust the response time, fill rate, overshoot and etc. With the PID control we used we had no overshoot and the response time was about 3 seconds to fill, or change to a new height.

2. Problems/Challenges – The main challenge was figuring out how to run some of the different pump models. Some of the different versions needed to be supplied 2 A from the power supply, which we didn’t realize. When we got our initial pump working we were able to operate it off of 10 V from the power supply. So, when some of the groups had issues with running the pumps off the power supplies we did not know where the issue was from. Figuring out how to get the sensor to work took a bit to research it, and we figured out we needed to make a voltage divider, but once we did it worked easily.

When calculating the Pk and R values we had difficulty making them fully automated. This took some iterations to figure out how to make Arduino calculate everything that we needed without having to take out data to an external graph.