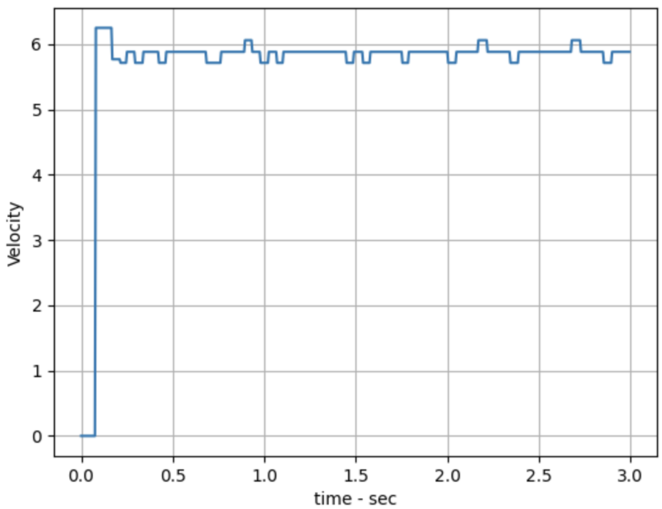
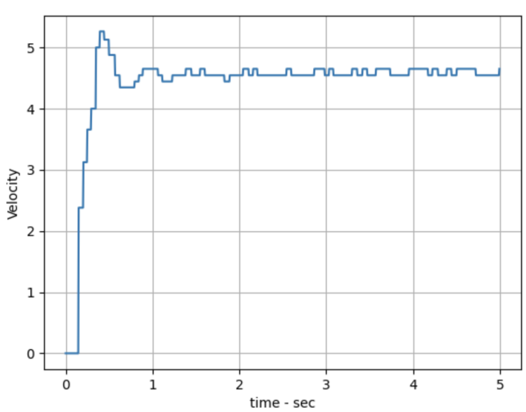
Question 4)



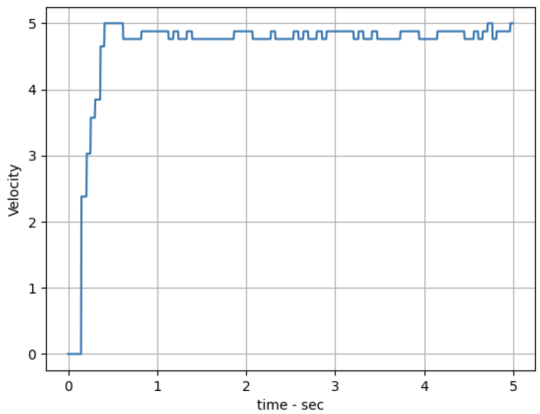

Response time: .1 seconds
It’s overshoot for its steady state is about 5%, but based on this graph, we can not tell it’s overshoot for 50% duty cycle

Question 7a) Kp equal to open loop gain



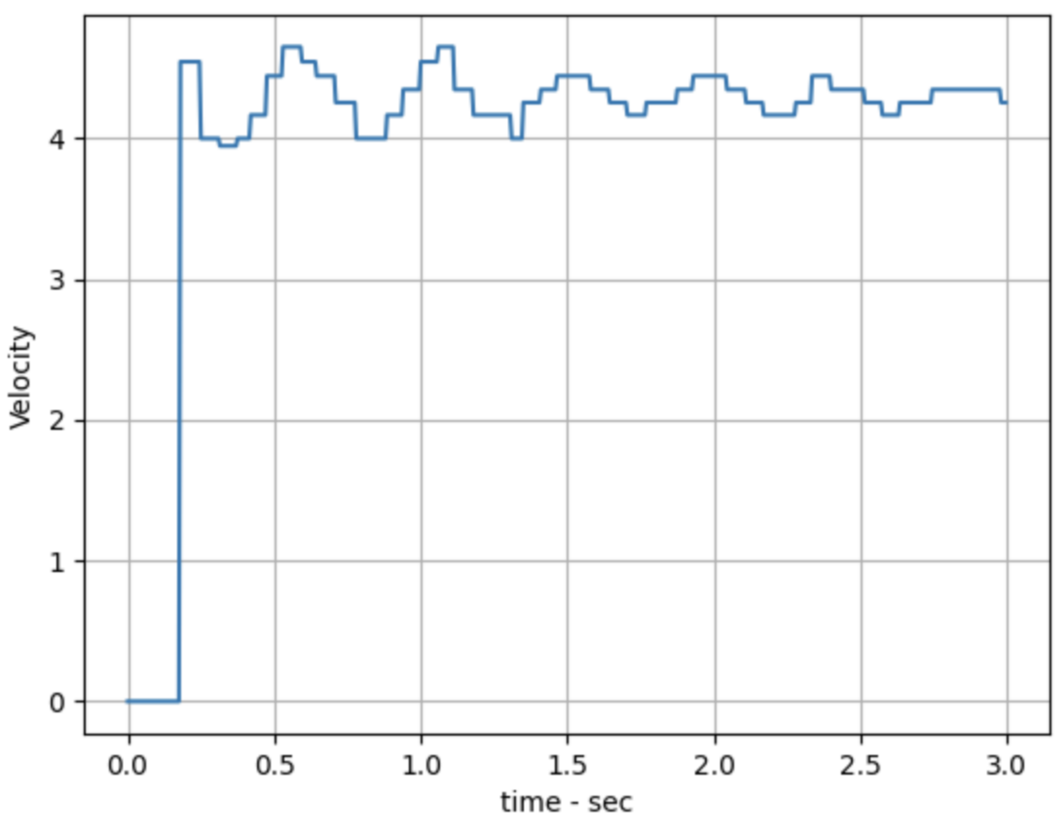

The overshoot is ~30% and the response time is about .4 seconds. The steady state error is about .5 rps.

Question 7b) Kp equal to half the open loop gain



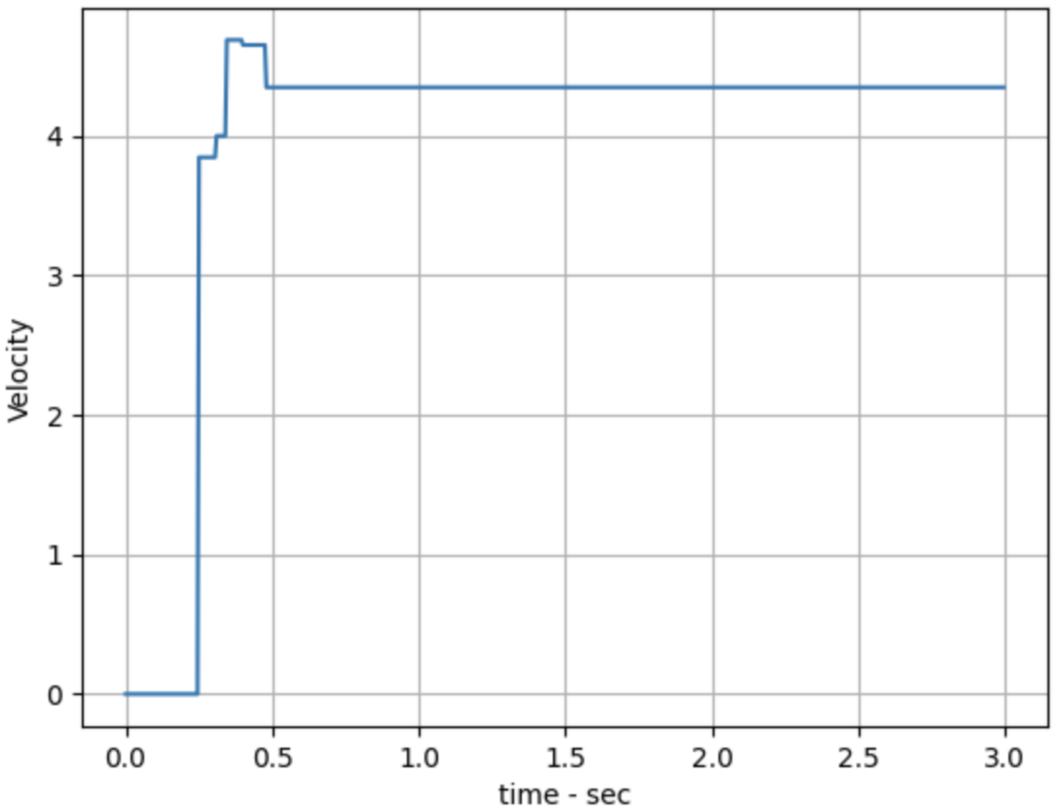

The overshoot is ~25% and the response time is about .5 seconds. The steady state error is about .8 rps.

Question 7c) Kp equal to double the open loop gain




The overshoot is ~12.5% and the response time is about .3 seconds. The steady state error is about .2 rps but it takes much longer to reach steady state error.

Question 7d) Kp equal to 10 times the open loop gain

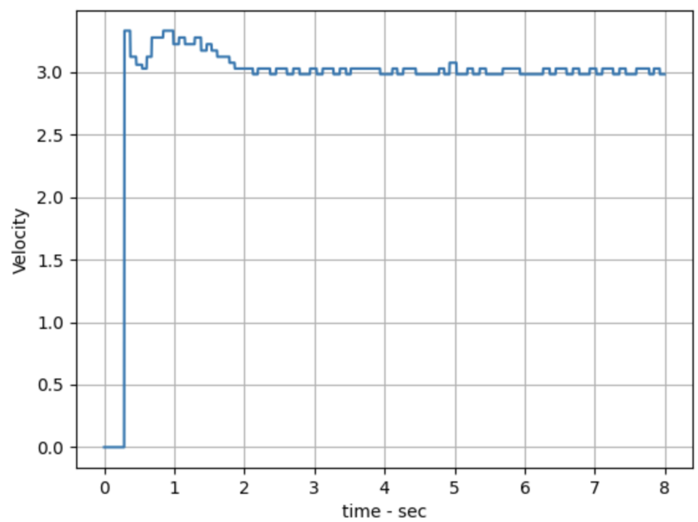



When we did 10 times the open loop gain, our system stopped working because it was changing duty cycles so rapidly.

Overall, when we increased kp, the response time decreased, the overshoot increased, the steady state error decreased, and the system became more unstable.

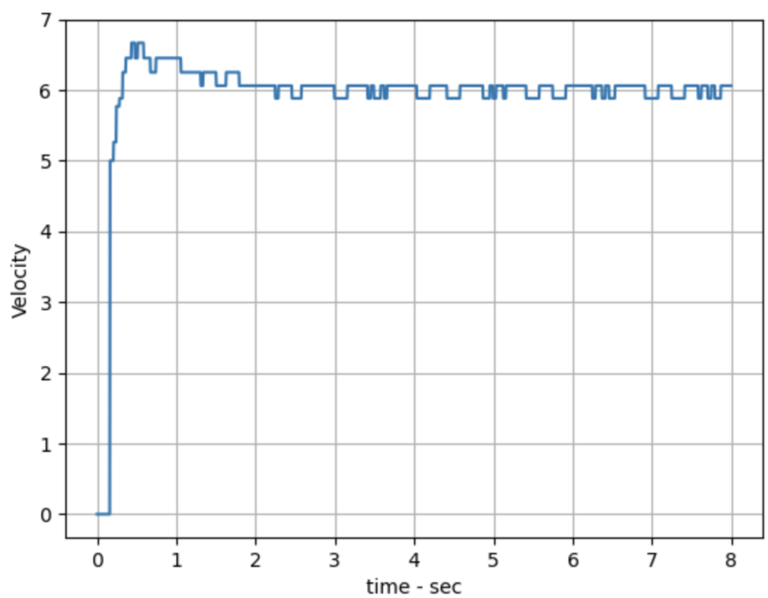
Question 8) rps 3

NOTE: We did an rps of 3 instead of 2 because our motor couldn't overcome static friction with our best fit equation.




The overshoot is ~8.3% and the response time is about .25 seconds. The steady state error is about .01 rps.

Question 8) rps 6




The overshoot is ~8.3% and the response time is about .5 seconds. The steady state error is about -.01 rps.