Experiment 3.B

Feedback Controller
Procedures

3.B.0 Turn in your Pre-Lab before doing anything else
3.B.1 Speed Driver Circuit

NOTE: This lab is less step-by-step than previous labs. By now you should have an idea of the general process of simulate, build, then test. These steps must still be preformed! Include relevant information in you lab report, and document any extra work that was needed.
**Experiment 3 Part B Tasks**

**Task:** Design, build and experimentally verify the full closed-loop speed control system for one wheel

- The speed sensor circuit should include a comparator to generate a full scale 0V to 5V output signal
- Speed control includes two “stop & go” control inputs, **CW** and **CC**, and one speed reference input, **REF**
- Build and check the design using incremental steps, e.g. open-loop motor drive and speed sensing, closed-loop in one direction, closed-loop with two direction control

**Report**

- Describe and show results for each “build and check” step performed in your development process
- Show plots of the measured $w$ vs. $v_{\text{ref}}$ for CW and CCW operation, and solve for the gain $K_{\text{sense}}$
- Show derivation of the integral compensator transfer function
- Show derivation of $G(s)$
- Find poles of $G(s)$ and evaluate the step response; how fast is the speed controller?