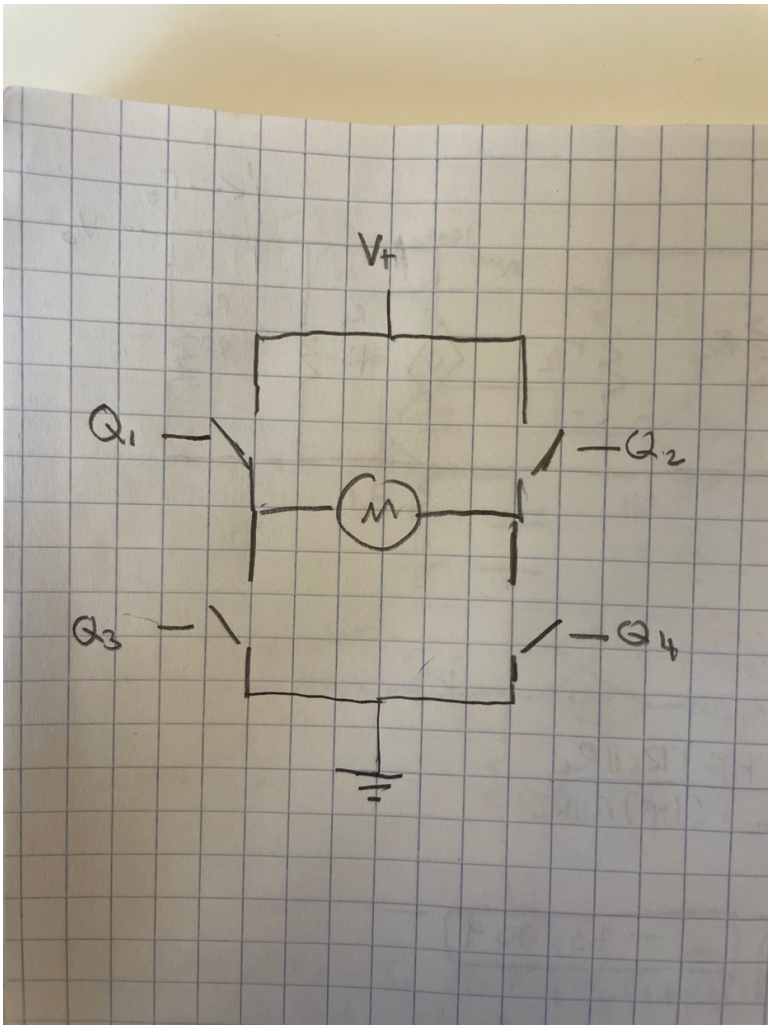
Quiz 9
Lance Go
ME 333

1. Gears are often used to reduce motor speed and increase output torque. List two complications that gears add to a system and why they are disadvantageous:

1). Gears increase output torque, which can be very advantageous in many applications, but reduce overall speed. In in application where system efficiency is very important, sacrificing speed for more torque might be more detrimental to the desired effect of the motor.
2). Some gears are not backdriveable. This will limit the motor to only be able to move in one direction.

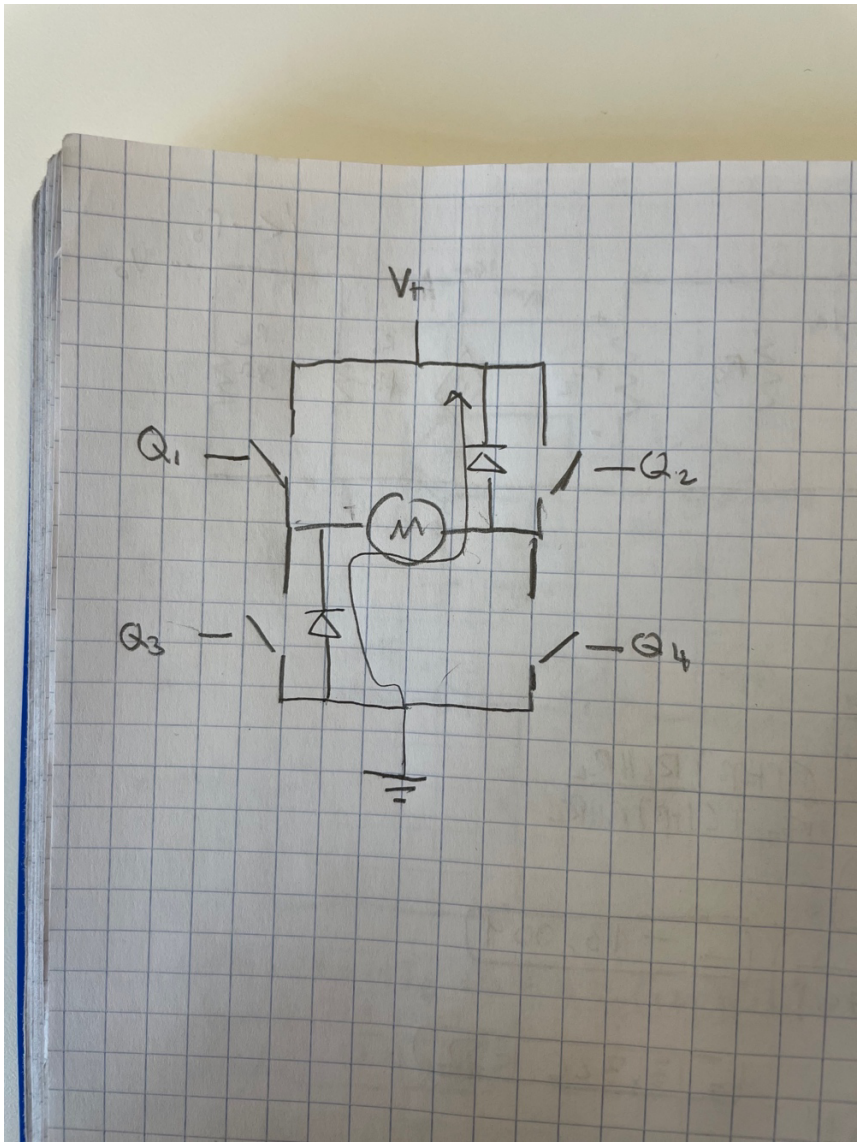
2. Draw a motor connected to 4 switches in an h-bridge configuration, label the switches 1 through 4:



3. Pretend a pair of switches has been closed for a long time while the motor has been stalled. The switches are then opened. Add two flyback diodes to protect the two switches

from sparks to your picture in #1, clearly showing which switches just opened and the relative position of the diodes that protect them.

Imagine that Q1 and Q4 have been active for a very long time, and then are opened. The diodes near Q2 and Q3 will be active.



4. Why does a current control loop typically occur much more frequently than a position control loop?

The current control loop is closer to the electrical components and behavior of the system, whereas the position control loop is entirely physical. Since electronic behavior operates on a much faster scale than the position control, the current control loop must be at a higher frequency than the position control loop.