

Quiz 8
Lance Go
ME 333

1. Write the motor power equation, derived in terms of V , τ , I , ω , L , and R :

$$IV_{\text{motor}} = \tau\omega + I^2R + LI \frac{dI}{dt}$$

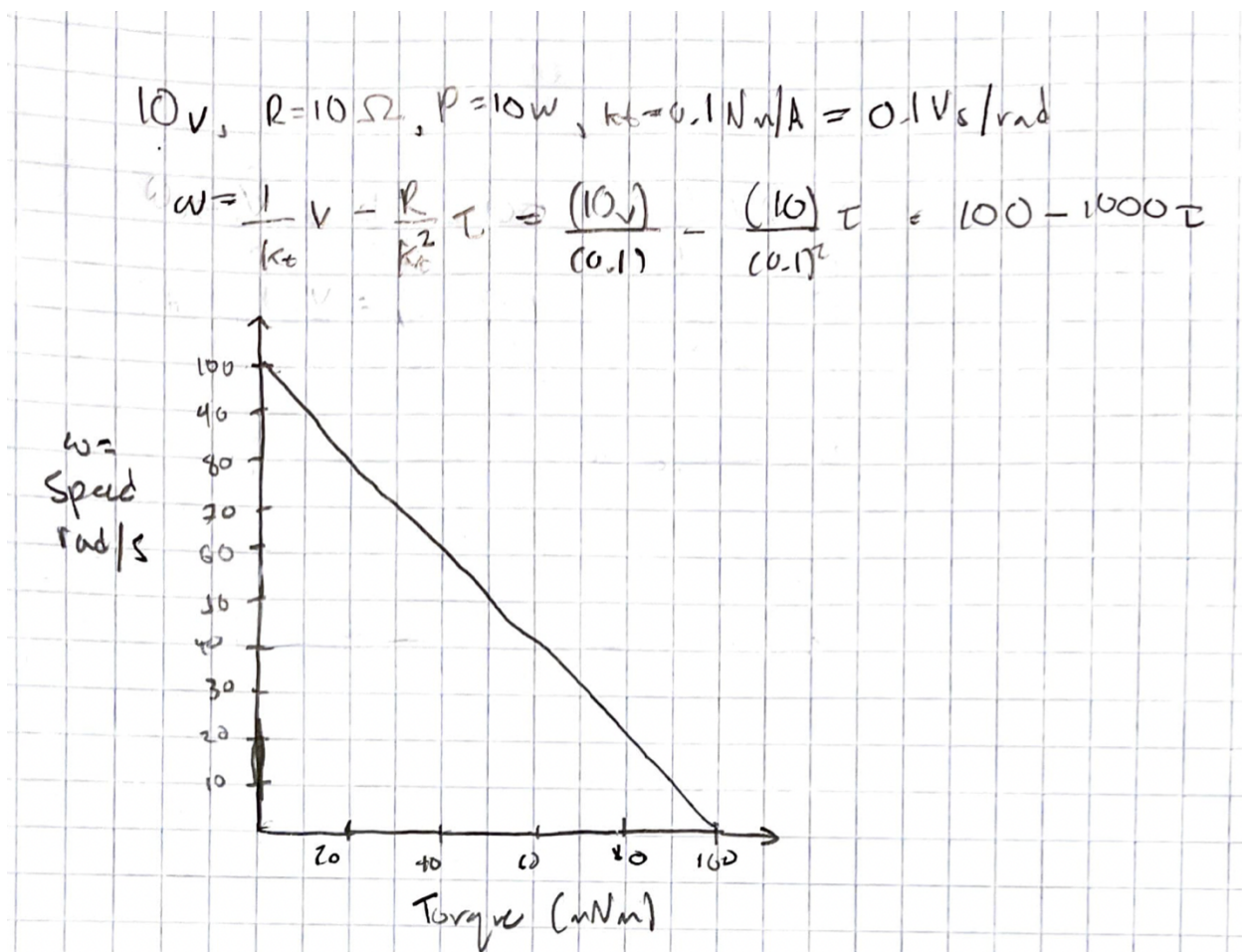
2. Describe what each part of the equation in #1 relates to:

$\tau\omega$: Mechanical power

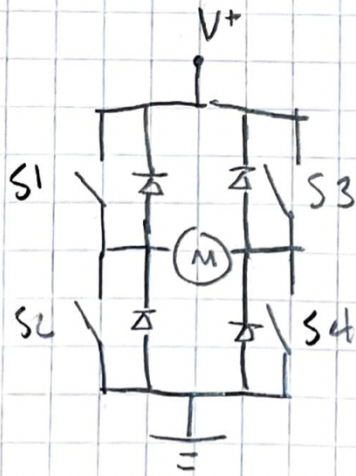
I^2R : Power dissipated as heat from the resistance of the motor

$LI \frac{dI}{dt}$: (time rate of change) power in the magnetic field

3. Draw the speed-torque curve for a motor at 10V, with $R = 10\Omega$, $P = 10W$, $k_t = 0.1\text{Nm/A} = 0.1\text{Vs/rad}$



4. Draw a motor connected to four switches, built in an h-bridge configuration. Label the switches that would need to close to make the motor rotate in one direction (either CW or CCW) and the switches to close to make the motor rotate in the other direction.



$S1 + S4$: forward motion
 $S2 + S3$: reverse motion