$G_m(s) = \frac{V_m(s)}{F(s)}$ $\quad m\dot{v}_m + c v_m = f$

$\rightarrow ms + c = \frac{F(s)}{V_m(s)} \rightarrow G_m(s) = \frac{1}{ms+c}$

$G_E(s) = \frac{F_a(s)}{V(s)} = \frac{F_a(s)}{I(s)} \cdot \frac{I(s)}{V(s)}$ $\quad f_a = K_t i \rightarrow \frac{F_a(s)}{I(s)} = K_t$

$G_E(s) = \frac{K_t}{Ls+R}$ $\quad L\frac{di}{dt} + Ri = V$

$\rightarrow Ls + R = \frac{V(s)}{I(s)} \rightarrow \frac{I(s)}{V(s)} = \frac{1}{Ls+R}$

Problem 2

K_p s.t. $\quad G_p(s) = 1$

$D(s) = K_p \quad \tau = 0.1$

$$\frac{V_m(s)}{R_m(s)} = \frac{K_p G_m(s)}{1 + K_p G_m(s)} = \frac{K_p/ms+c}{1 + K_p/ms+c} = \frac{K_p}{ms+c+K_p}$$

$$OCL = ms + c + K_p$$

$$\tau = -\frac{1}{s_{root}} = \frac{1}{-\frac{(c+K_p)}{m}} =$$

$$G(s) = \frac{500}{s(10s+1)(s+100)}$$

# of poles @ 0 = number of CW 180° contours