Chemical Engineering 436
Group Activity

Do the following, assuming that q is constant:
   a) Put each of the following equations into standard form
   b) transform each equation into the Laplace domain
   c) define the time constant and the gain(s) in terms of the parameters given
   d) find the transfer function between the specified variables.

1. Find $C'(s)/C_i'(s)$

$$\frac{dC'}{dt} = \frac{q}{V}C_i' - \frac{q}{V}C'$$

2. Find $C'(s)/C_i'(s)$

$$\frac{dC'}{dt} = \frac{q}{V}C_i' - \left(\frac{q}{V} + 2k_2\overline{C}\right)C'$$

Hint: let $\left(\frac{q}{V} + 2k_2\overline{C}\right) = \frac{1}{\beta}$

3. Find $T'(s)/T_i'(s)$ and $T'(s)/Q'(s)$

$$\frac{dT'}{dt} = \frac{q}{V}(T_i' - T') + \frac{Q'}{\rho V C_p}$$

Hints: let $\beta = \frac{q}{V}$ and $\alpha = \frac{1}{\rho V C_p}$