Homework 1A – DUE MONDAY 4/15

1. Equation (1.9) states

$$\frac{dp}{dt} = k_2 e$$

Integrate the equation to find *p(t)*

2. The limit in equation (1.12) is bounded, find

$$\lim_{s\to 0} \frac{V_{\max} s}{K_s + s}$$

$$\lim_{s\to \infty} \frac{V_{\max} s}{K_s + s}$$

3. Show that at $s = K_s$ the reaction rate is half of the max rate.

4. Use the non-dimensional quantities

$$\sigma = \frac{s}{s_0}, \quad x = \frac{c}{e_0}, \quad \tau = k_1 e_0 t$$

and constants

$$\kappa = \frac{k_{-1} + k_2}{k_1 s_0}, \qquad \varepsilon = \frac{e_0}{s_0}, \qquad \alpha = \frac{k_{-1}}{k_1 s_0}$$

to show that

$$\frac{dc}{dt} = -(k_{-1} + k_2)c + k_1 s e$$

can be rewritten as

$$\varepsilon \frac{dx}{d\tau} = \sigma - x(\sigma + \kappa)$$