

## Assignment 1: Equations

### Question 1: The “Living” Ice

Derivation of  $K_{m2}$

$$v = \frac{V_{max}S_1S_2}{K_{m1}S_2 + K_{m2}S_1 + S_1S_2} \quad (1)$$

$$v(K_{m1}S_2 + K_{m2}S_1 + S_1S_2) = V_{max}S_1S_2 \quad (2)$$

$$K_{m1}S_2 + K_{m2}S_1 + S_1S_2 = \frac{V_{max}S_1S_2}{v} \quad (3)$$

$$K_{m2}S_1 = \frac{V_{max}S_1S_2}{v} - K_{m1}S_2 - S_1S_2 \quad (4)$$

$$K_{m2} = \frac{V_{max}S_2}{v} - \frac{K_{m1}S_2}{S_1} - S_2 \quad (5)$$

### Question 2: The Case of the possible Biomass

$$N = \begin{bmatrix} -1 & & & & & & & & 1 & -1 \\ 1 & -1 & & & & & & & & \\ & 1 & -1 & & & & & & & \\ & & 1 & -1 & & & & & & \\ & & & 1 & -1 & & & & & \\ & & & & 1 & -1 & & & & \\ & & & & & 1 & -1 & & & \\ & & & & & & 1 & -1 & & \\ & & & & & & & 1 & -1 & \\ & & & & & & & & 1 & \end{bmatrix}$$