# MATH3MB3 Exam Review

For every question below:

a) Classify the model.

b) Find the fixed point(s) of the model.

c) Determine the stability of the fixed point(s).

1.

$$S(t+1) = S(t) + m[N - S(t)] - S(t)[1 - e^{-\beta I(t)}]$$
$$I(t+1) = I(t) + S(t)[1 - e^{-\beta I(t)}] - [m + \gamma]I(t)$$

2. $N(t+1) - N(t) = R_{\max} N \frac{1-N(t)}{N_{\max}}$

3. $N(t+2) = N(t+1) + 3N(t)$

   d) Determine the time dependent solution if $N(0) = 0$ and $N(1) = 1$.

4.

$$\frac{dS(t)}{dt} = -\mathcal{R}_0 SI$$
$$\frac{dI(t)}{dt} = \mathcal{R}_0 SI - I$$

5.

$$P(t+1) = \gamma\alpha\sigma P(t) + \sigma\beta S(t)$$
$$S(t+1) = \gamma\sigma(1-\alpha)P(t)$$

6. $\frac{dx}{dt} = a - bx$

   d) Find the general solution to the model.

7. $\frac{dx}{dt} = rN(1 - \frac{N}{K})$

   d) Find the general solution to the model.

8.

$$\frac{dx_1}{dt} = x_1 + 2x_2$$
$$\frac{dx_2}{dt} = 3x_1 + 2x_2$$