

**NST Part IA Quantitative Biology
Michaelmas Term**

Specimen Assessed Practical 1

Name:

College:

User ID:

Score:	Demonstrator:
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Answer all the questions in the space provided. Questions (1)-(3) should be attempted without using the computer and Question (4) should be answered using Mathcad.

The growth of an animal population, $Y(t)$, is described by the following differential equation,

$$\frac{dY}{dt} = \beta(K - Y)$$

(1) Sketch the graph of dY/dt against Y .

(2) What are the equilibrium points for the population?

- (3) Use your sketch from question (1) to determine the stability of each equilibrium.

For question (4) the Mathcad file for solving the differential equation numerically is called:

I:\BIOMATHS\MATHCAD\MONOMOL.MCD

Open this file in Mathcad.

- (4) Solve the model numerically (i.e. using Mathcad) with different initial conditions to check your answers to questions (2) and (3). Sketch the Mathcad output in the space below.

(i) $0 < Y_0 < K$

(ii) $Y_0 > K$

- (5) Comment briefly on the biological implications of your results.