

MCMS Problem Set

Name: Qusai Al-buqaen

Student.no: 244849

Part 3 Question 4

rearranging equation from part 3

$$\frac{1}{y + \left(\frac{\beta}{N(\gamma - \beta)} \right)} \cdot \dot{y} = \gamma - \beta \rightarrow \text{now integrate both sides with respect to time}$$

$$\int \frac{1}{y + \left(\frac{\beta}{N(\gamma - \beta)} \right)} \cdot \frac{dy}{dt} \cdot dt = \int (\gamma - \beta) dt$$

$$\int \frac{1}{y + \left(\frac{\beta}{N(\gamma - \beta)} \right)} dy = \int (\gamma - \beta) dt$$

$$\rightarrow \ln \left(y + \frac{\beta}{N(\gamma - \beta)} \right) = (\gamma - \beta)t + C \rightarrow \text{exponentiate both sides}$$

$$\rightarrow y + \frac{\beta}{N(\gamma - \beta)} = e^{(\gamma - \beta)t} \cdot e^C$$

$$\rightarrow y + \frac{\beta}{N(\gamma - \beta)} = X e^{(\gamma - \beta)t}$$

Since e^C is a constant
lets assume
 $e^C = X$

$$\text{So } \boxed{y(t) = X e^{(\gamma - \beta)t} - \frac{\beta}{N(\gamma - \beta)}}$$

(b)