

$$\frac{dS}{dt} = -\frac{\beta SI}{N} \frac{dS}{dt} = \frac{\beta SI}{N} - \gamma N \frac{dS}{dt} = \gamma N$$

$$\frac{dS}{dt} = -\frac{\beta SI}{N} \tag{1}$$

$$\frac{dS}{dt} = \frac{\beta SI}{N} - \gamma N \tag{2}$$

$$\frac{dS}{dt} = \gamma N \tag{3}$$