

14 Jan 2021

exponential growth:

$$\frac{dI}{dt} = (\beta - \gamma) I \quad : \text{mean infectious period} = 1/\gamma$$

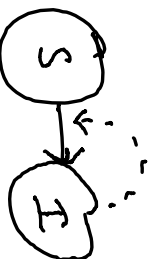
NO DELETION OF SUSCEPTIBLES

forget about death + recovery (for now)

$$\gamma \rightarrow 0$$

$$\left\{ \begin{array}{l} \frac{dS}{dt} = -\beta SI, \quad \frac{dI}{dt} = \beta SI \end{array} \right.$$

(gas molecule)  
rate of contacts  $\propto S, I$

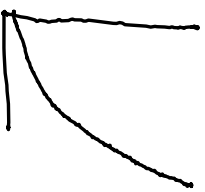
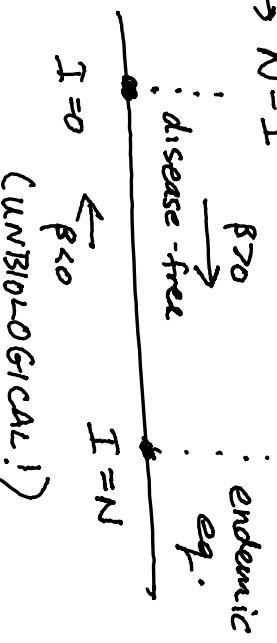


always assume  
by default that  
outflow is  
PER CAPITA

2dim system?  $N = S + I : S \rightarrow N - I$

$$\frac{dI}{dt} = \beta(N - I)I$$

$$0 \leq I \leq N$$



14 Jan p2

EASY diff eqs: (linear)

moderate DEs: (eg quadratic, Bernoullis)

EVERYTHING else: most models in biology

SOLUTION: need numerical

we can establish equilibria, local asy eq,  
(2D or 3D ~ phase planes)  
bifurcation analysis

NOTES: sol'n by partial fractions.

$$\left\{ \frac{dI}{(N-I)I} = \int \beta dt \right.$$

LOGISTIC growth model.

