

11-4-05

①

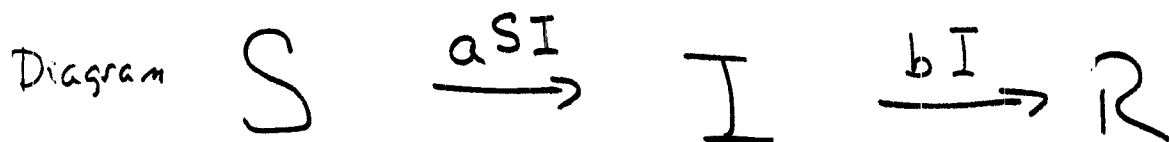
Ch 7 HW Due Today CI 312 3PM.

Ch 8 HW Due Next Fri

to 186 Exercises Not Discussion Q.
2a,d, 3a,d, 4,5

Ch 7/8 Reading (Moodle) Close Sunday

Epidemic Models



Equations

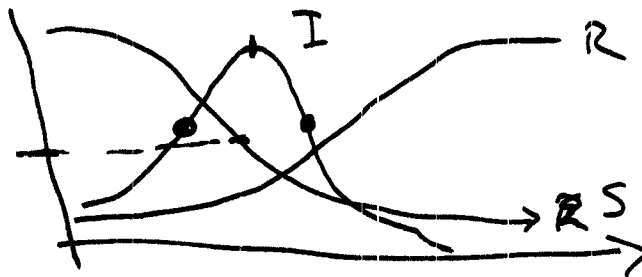
$$\frac{\Delta S}{\Delta t} = -aSI$$

$$\frac{\Delta I}{\Delta t} = +aSI - bI$$

$$\frac{\Delta R}{\Delta t} = +bI$$

Graph

$70 \approx \frac{b}{a}$



What can we say about I decreasing

$$I \text{ decreasing} \Leftrightarrow \Delta I \leq 0$$

$$\Delta I = aSI - bI \leq 0$$

$$(aS - b)I \leq 0$$

$$aS - b \leq 0 \text{ or } I \geq 0$$

I = 0 - Outbreak Solution

- Either - cure every infected person
- destroy - - - - -
- quarantine

$$aS - b \leq 0 \Leftrightarrow S \leq \frac{b}{a} = \text{Threshold Population}$$

Spreadsheet: $S \leq \frac{.125}{.0018} \approx 69$

Two Options

① Decrease S by vaccination, ~~quar~~

② Increase Threshold

$$\frac{b}{a} = \frac{\frac{1}{\text{recovery time}}}{\frac{\# \text{ contacts} * \# \text{ ch inf/contact}}{\text{Total Pop}}} = \frac{\text{Total Pop}}{\text{recov.} * \# \text{ contacts} * \# \text{ ch inf/cut.}}$$

We can increase Threshold by (3)

decreasing

contacts - Move likely to stay home SARS
abstinence - STD's

Chance infection/contact.

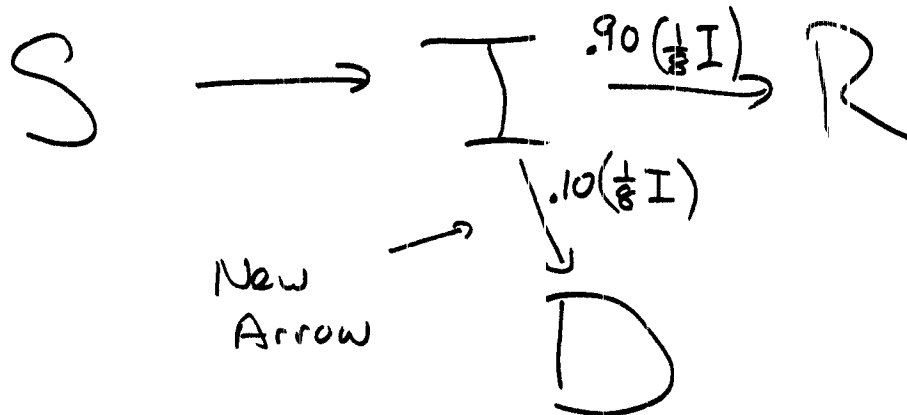
Masks - SARS

Wash Hands

Use protection STD's

All of the above have personal benefits but they also contribute to limiting ~~the~~ spread of infection by increasing the Population Threshold.

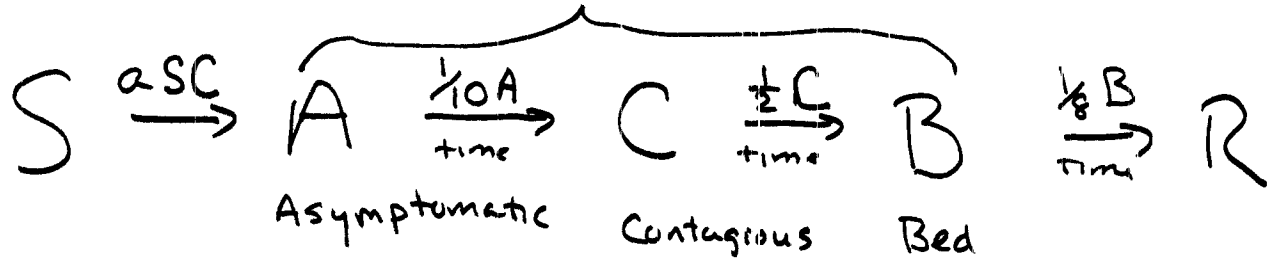
Modern Measles → Medieval Measles ← Suppose 10% of those infected don't survive



Modify the basic SIR model.

I

becomes



Common Cold

