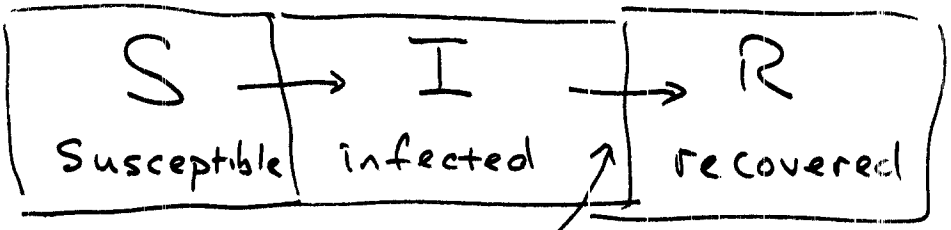
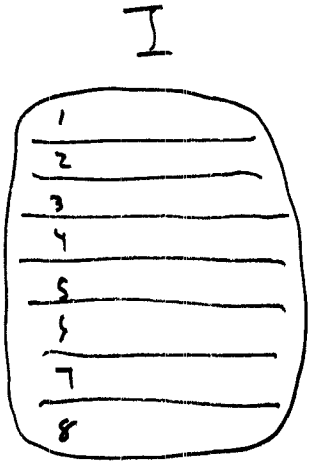
11-2-05

Properties of the Measles

- To begin with some one has to have the measles
- People catch the measles by coming into contact with peoplea already infected - But not all contacts lead to new infections
- People recover from the measles & are then immune.
- Total Population won't change

Model Compartments





Assume people stay infected for 8 days

→ $\frac{1}{8}$ of I group will recover

$\frac{1}{8} I$ = # newly recovered

Look Alicia Aguirre. a student in a school of 500 where 2 Students are infected w/ measles.

Avg # contacts w/ other students / day	5
Chance of one contact leading to Measles	.90

Chance of Contact w/ I	$\frac{2}{500}$
# contacts w/ I	$5 \cdot \frac{2}{500} = .018$
Chance of AA getting infected	$(.90)(5)\left(\frac{2}{500}\right) = 1.8\%$

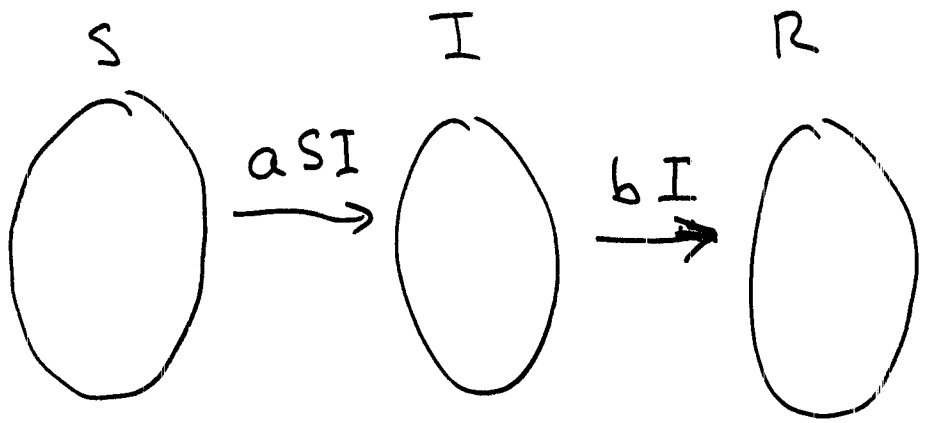
$$\#\text{ new infecteds} = 498 \cdot 1.8\%$$

$$= 498 \cdot (.90)(5)\left(\frac{2}{500}\right)$$

$$= S\,\frac{(.90)(5)}{500}\,I$$

$$= \frac{(\text{Chance infection/contact}) \cdot (\#\text{ contacts/day}) \cdot S\,I}{\text{Total Population}}$$

$$= a \cdot S\,I$$



Change Equations

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

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

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

* Each arrow in the diagram leads to two terms in the Δ equations
The tail $\leftrightarrow$ − term; the tip $\leftrightarrow$ + term