11-1-05

Like p 165 #6

Change

$$\frac{\Delta x}{\Delta t} = 4x - .04x^2 - .03xy$$

$$\frac{\Delta y}{\Delta t} = 2y - .01y^2 - .005xy$$

(Both are logistic b/c of squared terms)

(Both interaction terms positive → cooperative symbiotic species)

Both interaction terms negative → Competing species

Equilibrium Points

$\Delta x = 0$

	$x = 0$	$4 - .04x - .03y = 0$
		$4 - .04x = 0$
$\Delta y = 0$ $y = 0$	$(0,0)$	$\frac{4}{.04} = x = 100$ $(100,0)$
$2 - .01y - .005x = 0$	$2 - .01y = 0$	$4 - .04x - .03y = 0$
	$\frac{2}{.01} = y$	$2 - .01y - .005x = 0$
	$200 = y$	$-3(2 - .005x - .01y = 0)$
	$(0,200)$	$-6 + .015x + .03y = 0$
		$-2 - .025x + 0y = 0$
		$x = \frac{2}{-.025} = -80$

Won't be in phase plane. $x \geq 0$

Phase Plane

$\Delta x = 0$

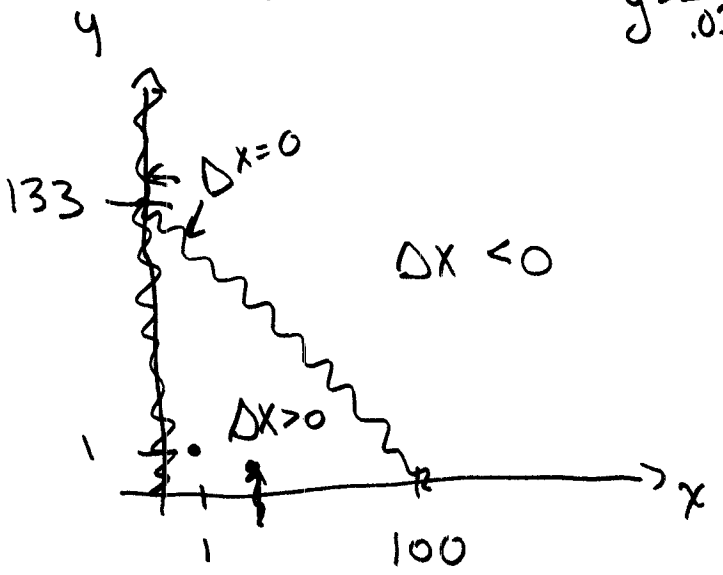
$x = 0$

$4 - .04x - .03y = 0$

x	100	0
y	0	133

$4 - .03y = 0$

$y = \frac{4}{.03}$



$\Delta y = 0$

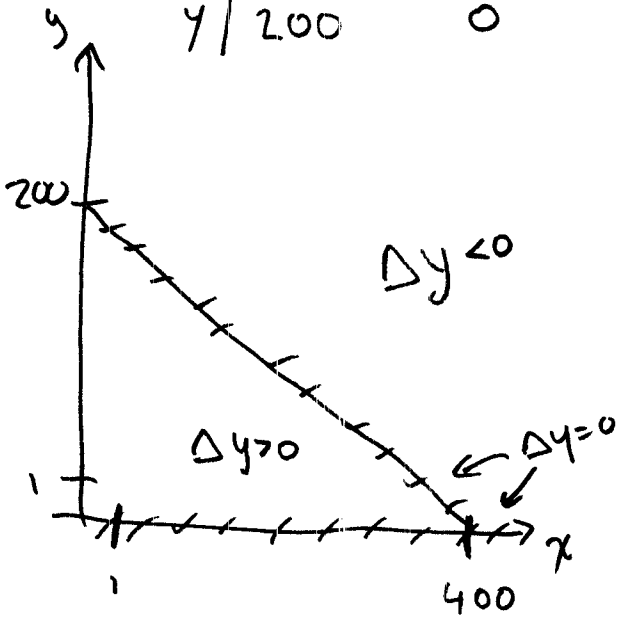
$x = 0$

$2 - .01y - .005x = 0$

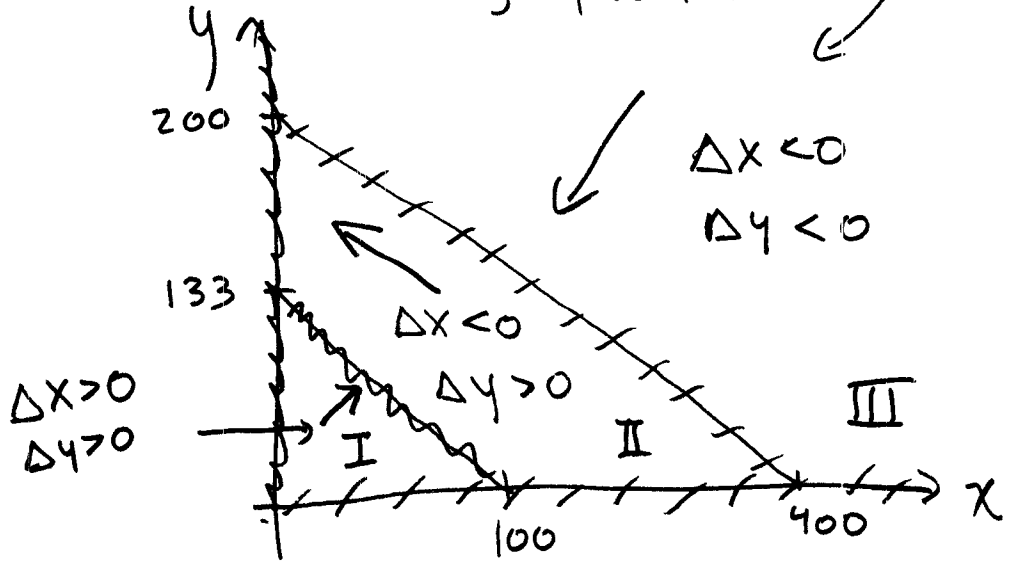
$2 - .005x = 0$

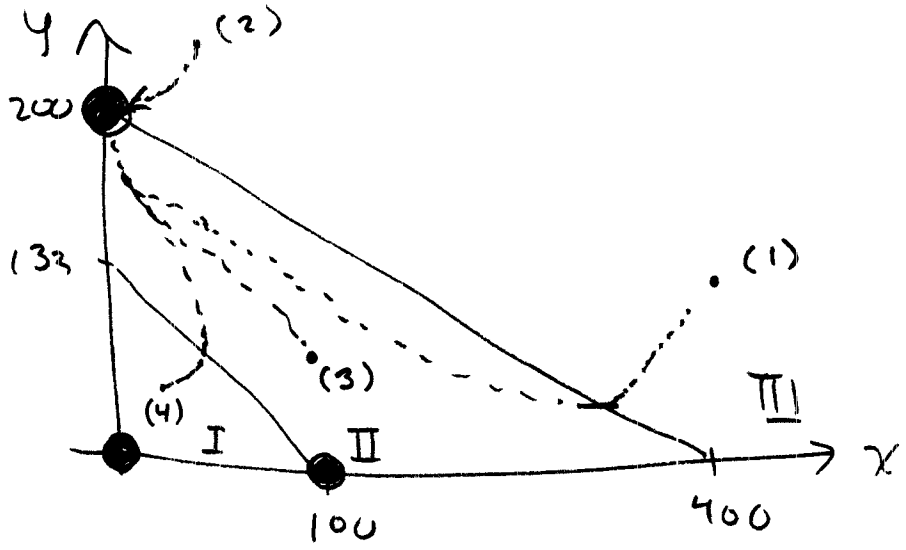
$\frac{2}{.005} = x$

x	0	400
y	200	0



↳ put together





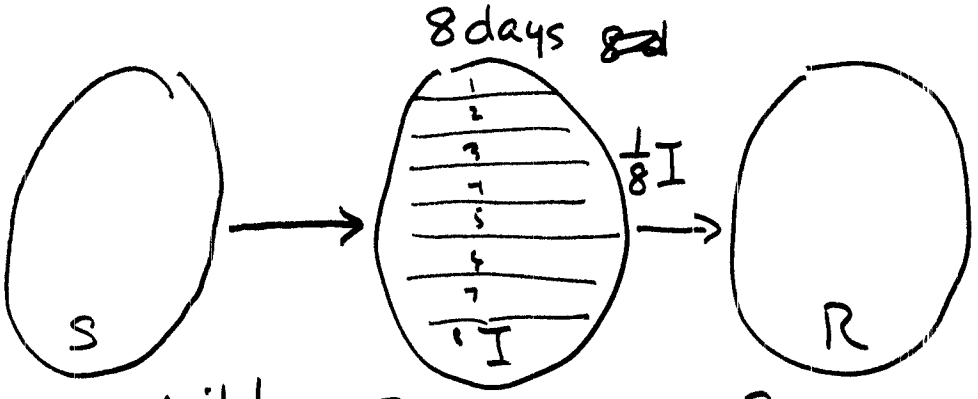
Any combination (x,y) outside Region II will lead towards Region II. Any point (x,y) ~~with~~ in Region I will move towards the equilibrium point (0,200).

At (0,200) x is extinct & y is at its carrying capacity.

Features of the Measles

- There are some people with measles
- People get measles by coming into contact with people with the measles
- People recover from the measles

Three Groups that include everybody



Chance of AA meeting student with measles $\frac{2}{500}$

Chance of having M.E. w/ infected $5 \cdot \frac{2}{500}$

Chance of A.A. getting infected $(.90)(5)\left(\frac{2}{500}\right) = 1.8\%$

Chance of one new student getting Infected $498 \cdot (.90)(5)\left(\frac{2}{500}\right)$

$S \to I \quad \left(\frac{(.90)(5)}{500}\right)$

$S = 498$ = # susceptible

$I = 2$ = # infected

5 = avg # contacts/day

.90 = chance of 1 contact $\rightsquigarrow$ infection

500 = Total pop of school.

$$S \xrightarrow{0.09SI} I \xrightarrow{\frac{1}{8}I} R$$