

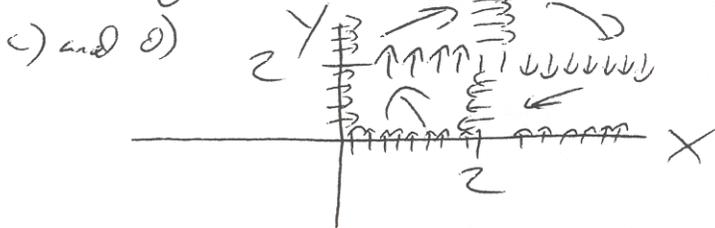
Problem Set 30

Differential Equations Handout

13. a) Competitive, because the xy terms have negative coefficients in both cases

b) $.05xy = .1x$ $.05xy = .1y$
 $y = 2$ $x = 2$

equilibrium is at 2000 of each species



e) if $x=0$, y increases without bound
 if $y=0$, x increases without bound



g) i) Beest X starts at 1.8 and begins decreasing.
 Beest Y starts at .9 and begins increasing.
 ii) Beest X starts at 2.3 and begins decreasing.
 Beest Y starts at 1.15 and begins decreasing.
 iii) Beest X starts at 2 and begins decreasing.
 Beest Y starts at 1.1 and begins increasing.

h) This model contradicts Darwin, because neither species is eliminated.

15. Accepting all "thoughtful" answers.

Section 7.6

1. a) x = predator with no additional food sources
 y = prey with no additional growth restrictions
 b) x = prey restricted by predator and carrying capacity
 y = predator with no additional food sources

2. a) cooperative model b) competitive model

Chapter 7 Review

20. a) y = bird, x = insect b) equilibrium at $y=0, 200$ and $x=0, 25,000$
 c) $\frac{dy}{dx} = \frac{-2y + 0.000008xy}{0.4x - 0.002xy}$ d) e)

21. a) increases logarithmically c) they stabilize at d)
 b) equilibrium at $y=0, 175$ and $x=0, 25,000$ and $200,000$
 $x=0, 25,000$ and $y=175$

Section 7.1, due April 24 (PS 30) for TTh and A

4. $y = e^{rt} \rightarrow y' = r e^{rt} \rightarrow y'' = r^2 e^{rt}$
if $y'' + y' - 6y = 0$, $r = -3$ or 2

5. (b) and (c) are solutions to y'