

MATH 209 QUIZ 5 - Version B

March 16, 2015

Name: ANSWERS

**Instructions:** Write your answers in the space provided. Do not show calculations on this page.

$$\frac{dN_1}{dt} = 0.12N_1 \left( 1 - \frac{N_1}{100} - \frac{N_2}{50} \right)$$

1. Consider the system of ODEs:

$$\frac{dN_2}{dt} = 0.53N_2 \left( 1 - \frac{N_2}{150} - \frac{N_1}{50} \right)$$

(a) State the steady states: (0,0), (0,150), (40,30), (100,0) (coordinates!)

(b) Is the system competitive (Yes or No)? Yes

(c) Justify your response to (b) by any method.

Competition table

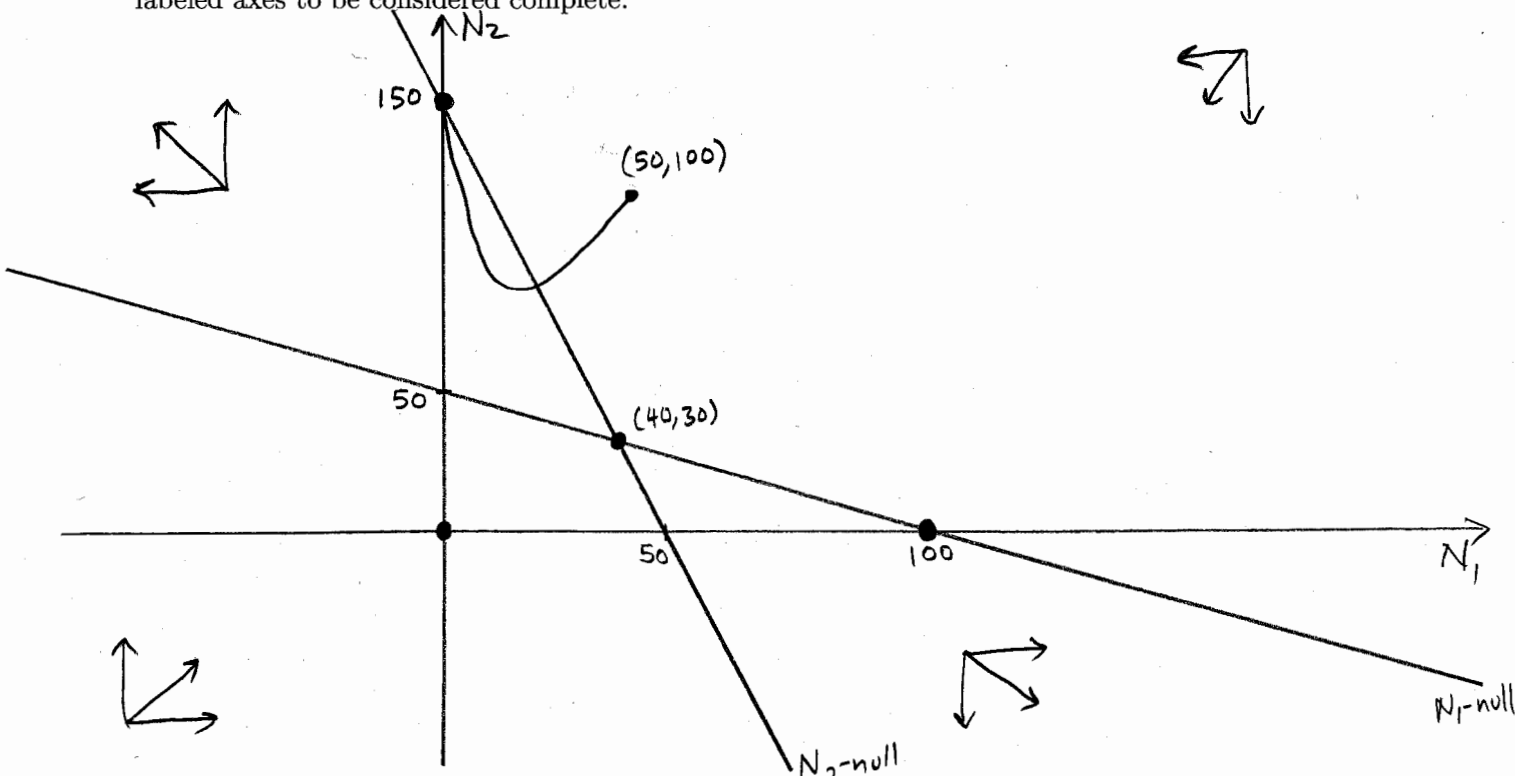
	1	2
1	0.01	0.02
2	0.02	0.007
Total	0.03	0.027

⇒ Competitive

OR

Lo's Method  
depends

(d) Plot the phase plot for the solution curve with initial value  $(N_1, N_2) = (50, 100)$ . Your answer must include the graphs of nullclines, stability arrows, and the phase plot on fully labeled axes to be considered complete.



**Bonus:** Consider the data set: 13,3,2,15,13,10,7,13,6,3. What are the:

mean = 8.5 mode = 13 median = 8.5  $q_1 =$  3  $q_3 =$  13