Math 341 Fall 2008

BONUS QUIZ 3 **Differential Equations**

Name: ______________________________

Friday October 17
Prof. Ron Buckmire

Topic : Linear Systems of Equations

The idea behind this quiz is to provide you with an opportunity to illustrate your understanding of solution curves of linear systems in 2-D.

Reality Check:

EXPECTED SCORE : __________**/5** ACTUAL SCORE : __________**/5**

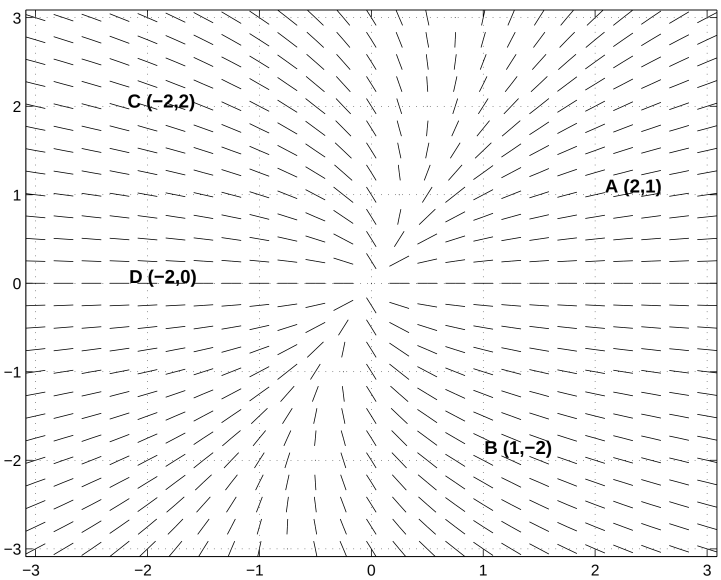
Instructions:

0. Please look for a hint on this quiz posted to `faculty.oxy.edu/ron/math/341/08/`
1. Once you open the quiz, you have **30 minutes** to complete, please record your start time and end time at the top of this sheet.
2. You may use the book or any of your class notes. You must work alone. **Do not mention the existence of this quiz to anyone else in the class.**
3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy one. QUIZZES WITH UNSTAPLED SHEETS WILL NOT BE GRADED.
4. After completing the quiz, sign the pledge below stating on your honor that you have adhered to these rules.
5. Your solutions must have enough details such that an impartial observer can read your work and determine HOW you came up with your solution.
6. Relax and enjoy...
7. **This bonus quiz is due on Monday October 20**, with the rest of your week's homework. NO LATE OR UNSTAPLED QUIZZES WILL BE ACCEPTED.

Pledge: I, ______________________, pledge my honor as a human being and Occidental student, that I have followed all the rules above to the letter and in spirit.

1. Consider the slope field for the given system

$$\frac{dx}{dt} = -2x + \frac{1}{2}y$$
$$\frac{dy}{dt} = -y$$



(a) *2 points.* Classify the equilibrium point at the origin. (In other words identify its stability and give it one of the standard names.)

(b) *4 points.* Indicate the trajectories for solutions which start at the initial conditions $A = (2, 1)$, $B = (1, -2)$, $C = (-2, 2)$ and $D = (-2, 0)$. (**USE ARROWS!**) HINT: Find the straight line solutions and draw those in on the axes as well.

(c) *4 points.* In the space, sketch graphs of $x(t)$ and $y(t)$ on the same axis for each of the given four initial conditions. (Therefore you should have a total of four pairs of axes, with 2 curves on each.) **Clearly indicate what happens as $t \to \infty$ for each solution curve.**