

BONUS QUIZ 5

Differential Equations

Name: \_\_\_\_\_

Friday March 25  
Ron Buckmire

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**Topic :** Systems of Differential Equations

The idea behind this quiz is to provide you with another opportunity to illustrate your understanding of how to visualize the solutions associated with systems of differential equations.

**Reality Check:**

EXPECTED SCORE : \_\_\_\_\_/10

ACTUAL SCORE : \_\_\_\_\_/10

**Instructions:**

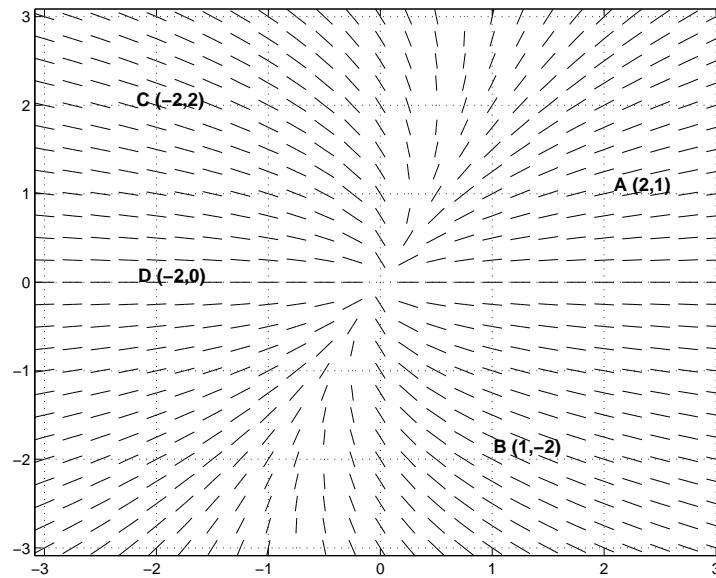
1. Please look for a hint on this quiz posted in the News section of the course website at <http://faculty.oxy.edu/ron/math/341>.
2. You may use the book or any of your class notes. You must work alone.
3. If you use your own paper, please staple it to the quiz before coming to class. If you don't have a stapler, buy one.
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 quiz is due on Monday March 28**, in class. NO LATE 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.

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1. Consider the slope field for the given system

$$\begin{aligned}\frac{dx}{dt} &= -2x + \frac{1}{2}y \\ \frac{dy}{dt} &= -y\end{aligned}$$



(a) 2 points. Determine the type of equilibrium point at the origin.

(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!)

(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 four pairs of axes, with 8 curves.) **Clearly indicate what happens as  $t \rightarrow \infty$  for each solution.**