

BONUS QUIZ 2

Differential Equations

Name: _____

Friday February 11
Ron Buckmire

Topic : Considering a Homogeneous Equation

The idea behind this bonus quiz is to provide you with an opportunity to illustrate your understanding of solving homogeneous ordinary differential equations.

Reality Check:

EXPECTED SCORE : _____/10

ACTUAL SCORE : _____/10

Instructions:

1. Please look for a hint on this quiz posted to blackboard.oxy.edu
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 February 14**, 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.

1. Consider the nonlinear first-order differential equation from **Quiz 3**

$$\frac{dy}{dx} = \left(\frac{y}{x}\right)^2 + 2\frac{y}{x}.$$

(a) *5 points.* Show that this **homogeneous** equation $y' = F(y/x)$ can be transformed into a *separable* equation using the transformation $u = y/x$ (i.e. $y = ux$) of the form $x\frac{du}{dx} = F(u) - u$

(b) *5 points.* If possible, find each of the particular solutions which go through the points $(1, 1)$, $(1, 0)$ and $(0, 1)$ respectively. DISCUSS YOUR ANSWERS.