Math 341 Spring 2005

BONUS QUIZ 7   **Differential Equations**

Name: _____

Friday April 15
Ron Buckmire

Topic : Forcing Functions

The idea behind this quiz is to provide you with another opportunity to illustrate your understanding of Laplace Transforms, Delta functions and Heaviside functions.

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 April 18** , in class. NO LATE QUIZZES WILL BE AC-CEPTED.

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 initial value problem

$$y'' + y = f(t), \quad y(0) = 0, \quad y'(0) = 1$$

We're interested in analyzing how the solution $y(t)$ (output function) varies with the input $f(t)$ (forcing function).

(a) *1 point.* Find $y(t)$ when $f(t) = 0$

(b) *1 point.* Find $y(t)$ when $f(t) = 1$

(c) *3 points.* Find $y(t)$ when $f(t) = \mathcal{H}(t - \pi)$

(d) *3 points.* Find $y(t)$ when $f(t) = \delta(t - \pi)$

(d) *2 points.* Use graphing software to sketch the output function for each of the various input functions $f(t)$. **Clearly indicate which graph corresponds to which solution.**