BONUS QUIZ 6   **Differential Equations**

Name: _____

Friday April 4
Ron Buckmire

Topic : Solving Initial Value Problems with Discontinuous Functions

The idea behind this quiz is to provide you with another opportunity to illustrate your understanding of the use of Laplace Transforms.

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 11** , 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. Let $y'' + 4y = f(t)$, $y(0) = 0$, $y'(0) = 0$ where $f(t) = \begin{cases} \sin(t), & 0 \le t < 2\pi \\ 0, & 2\pi \le t \end{cases}$

(a) *2 points.* **Show** that the forcing function $f(t) = \sin(t) - \sin(t - 2\pi)\mathcal{H}(t - 2\pi)$.

(b) *6 points.* **Solve** the initial value problem $y'' + 4y = f(t)$, $y(0) = 0$, $y'(0) = 0$.

(c) *2 points.* **Sketch** the forcing function $f(t)$ and the solution $y(t)$ on the same axes for $0 \le t \le 4\pi$.