

Quiz 10

Differential Equations

Name: _____

Time Begun: _____

Time Ended: _____

Friday April 15

Ron Buckmire

Topic : Convolution

The idea behind this quiz is to provide you with another opportunity to illustrate your understanding of convolution and 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 18** , 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 following “auto-convolution” equation

$$f * f = \int_0^t f(\tau)f(t - \tau) d\tau = 6t^3$$

(a) *5 points.* **Show** that the function $f(t) = \pm 6t$ is the solution of the above equation. (Solve the equation and show that the solution is indeed the given function.)

(b) *5 points.* **Confirm** that if $f(t) = \pm 6t$, then the convolution of $f(t)$ with itself is $6t^3$. (Check that the given function indeed satisfies the given equation.)