

# DIFFERENTIAL EQUATIONS MATH 3D

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## Extra Quiz

Read these instruction carefully.

1. This is a set of problems, to earn extra credit. Participation is voluntary.
2. Participation can only improve your performance. It gives you a chance to improve the score you earned in the quizzes.
3. Upon participation, this set of problems counts as an additional quiz you completed. Should you participate, the quizzes with the two lowest scores will be dropped; this is one more than what would be dropped without participation. This means, should you do worse than your lowest quiz score so far, than the extra credit quiz will be the second quiz dropped. Should you do well, than you have the opportunity to exchange your lowest quiz score.
4. This is a take home quiz. It is due on Thursday, June 3, at the discussion session.
5. You can use whatever material (book, internet, etc.) you wish. You have to however do the problems ON YOUR OWN. Communication with other human beings about these problems is not permitted.
6. Show all your work and clearly define all the symbols you use.

## Problems

### Problem 1.

What is the smallest possible order of a linear homogeneous differential equation with constant coefficients that has a solution

$$y(x) = x^{2010} \sin(2010x) + e^{2010x} \cos(2010x)?$$

Explain your answer.

### Problem 2.

Find a family of curves orthogonal to the graphs of the functions

$$y = Cx^2, C \in \mathbb{R}.$$