

**Mathematics 41 Midterm Exam II – F. Goodman**  
**October, 1997**  
**Version 1**

1. Find a 2nd order linear ordinary differential equation whose general solution is

$$c_1 e^{3t} + c_2 e^{-2t} + 3t$$

2. Solve the initial value problem

$$y'' - 6y' + 10y = \sin(t)$$
$$y(0) = \frac{1}{39}, \quad y'(0) = \frac{3}{39}$$

Remark: It takes a number of steps to work this out. Please work the problem out in stages and make clear what you are aiming to accomplish at each stage.

- 3.

- (a) What is the Wronskian of a pair of functions?
- (b) Consider a second order homogeneous linear differential equation (with continuous coefficients)

$$y'' + p(t)y' + q(t)y = 0 .$$

What is meant by a fundamental pair of solutions to this equation? Give some equivalent conditions for a pair of solutions to be a fundamental family.