Name: _____

SID: _____

Section: _____

Math 250
Midterm Examination
July 26th, 2007

Instructions:

- To receive full credit, you must solve each problem on this exam fully and correctly.
- Be sure that your answers are legible and complete.
- Some questions have more than one part. Check carefully to ensure you don't miss any parts.
- Do not write on the line marked **Score** on the bottom of each page.
- **You MAY NOT use a calculator during this examination.**
- **There are 8 questions for a total of 100 points.**

(5points) 1. Which of the following pairs of functions is linearly independent?

1. $\sin 2t, \cos t \sin t$

2. $\sin(\frac{\pi}{2} - t), 2\cos t$

3. $(\sin t)^2, 2 - 2(\cos t)^2$

4. $\sin(\pi + t), \cos t$

(5points) 2. Which of the following can be a particular solution of $y^{(3)} + 4y' = \sin 2t + t$?

1. $A \sin 2t + Bt$

2. $A \sin 2t + B \cos 2t + Ct + D$

3. $At \sin 2t + Bt \cos 2t + Ct^2 + Dt$

4. $At \sin 2t + Bt \cos 2t + Ct + D$

 Score:_____

(15points) 3. Find the solution of the initial value problem:

$$3y'' - y' + 2y = 0, \quad y(0) = 2, \quad y'(0) = 0$$

 Score:_____

(15points) 4. Use the method of reduction of order to find a second solution of

$$t^2y'' + 2ty' - 6y = 0, \quad t > 0,$$

knowing that $y_1(t) = t^2$ is a solution. What is the general solution of this equation?

 Score:_____

(15points) 5. Find the general solution of the equation

$$y'' + 9y' = e^{3t} + t$$

 Score:_____

(15points) 6. Find the general solution of

$$4y'' - 4y' + y = 8e^{t/2}$$

using the method of variation of parameters.(NO credit will be given if other method is used.)

 Score:_____

(15points) 7. Find the general solution of

$$y^{(4)} - 8y' = 0$$

 Score:_____

(15points) 8. If y_1, y_2 are linearly independent solutions of $t^3y'' + 2ty' + te^t y = 0$ and if $W(y_1, y_2)(2) = 2e$, what is $\lim_{t\to\infty} W(y_1, y_2)$?

 Score:_____