I hereby affirm that the work on this exam is my own (aided only by the text and my lecture notes) and that I have given no aid to another on this exam. Further, I understand that violation of either of these two conditions may result in a score of zero on this exam as well as more serious consequences.

_______________________________________________________          _____________________________________
SIGNATURE                                                                                                DATE

Chapter four fall 18 -- due wed, oct 17 -- staple inside front cover of large exam booklet

Short Answer
Be sure to include justification for your answer (i.e., show work or give explanation, as appropriate).

1. Find two linearly independent solutions of the differential equation \( y'' - 4y' + 4y = 0 \).

2. Find a solution of the system of differential equations.
\[
\frac{dx}{dt} = 3x - y \\
\frac{dy}{dt} = 9x - 3y
\]

3. Find a solution of the differential equation \( y'y'' = 4 \).

4. Find the Wronskian of the functions \( e^x \) and \( e^{3x} \).

5. One solution of the differential equation \( y'' + y = 0 \) is \( y = \cos x \). Use reduction of order to find a second linearly independent solution.

6. Find two linearly independent solutions of the differential equation \( y'' - 5y' + 6y = 0 \).

7. Find a particular solution of the differential equation \( y'' + 3y' + 4y = 8x + 2 \).

8. Find a particular solution of the differential equation \( y'' - 2y' + y = \sin x \).

9. Use variation of parameters to find a particular solution of the differential equation \( y'' + 2y' + y = e^{-x} \).

10. Without solving for the undetermined coefficients, give the correct form of a particular solution of the differential equation \( y'' + 9y = \sin(3x) \).

11. Find a solution of the differential equation \( x^2y'' - 3xy' + 4y = 0 \).

12. Solve the IVP with the system of DEs and ICs as follows.
\[
\frac{dx}{dt} = -6x + 5y \\
\frac{dy}{dt} = -5x + 4y
\]
\( x(0) = 1/3, y(0) = 0 \)

13. Solve the initial value problem \( 2y'' = 3y^2, y(0) = 1, y'(0) = 1 \).

14. Solve the differential equation \( y'' = 2x(y')^2 \).