Name:_____

Math 3113 *Practice Exam 2* *October 1, 2012*

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work or answer, you will receive little or no credit!

1. Determine on what intervals the following functions are linear independent:

$$f(x) = e^x, \quad g(x) = e^{3x}, \quad h(x) = e^{-x}$$

2. Determine on what intervals the following functions are linear independent:

$$f(x) = x, \quad g(x) = \cos(\ln x), \quad h(x) = \sin(\ln x)$$

3. Determine on what intervals the following functions are linear independent:

$$f(x) = x^2, \quad g(x) = \sin x, \quad h(x) = \ln x$$

4. Solve the following differential equation:

$$2y'' + 5y' + 5y = 0$$

5. Solve the following differential equation:

$$y'' - 6y' + 13y = 0$$

6. Solve the following IVP:

$$\begin{cases} y''' + 10y'' + 25y' = 0 \\ y(0) = 3, y'(0) = 4, y''(0) = 5 \end{cases}$$

7. Solve the following IVP:

$$\begin{cases} y''' + 3y'' + 4y' - 8y = 0 \\ y(0) = 3, y'(0) = 2, y''(0) = -9 \end{cases}$$

8. Solve the following differential equation:

$$y'' + 9y = 4\sin x$$

For convenience the roots to the characteristic equation are $r = 3i$ and $r = -3i$.

9. Solve the following differential equation:

$$2y'' - 7y' + 3y = 3x^2 e^x$$

For convenience the roots to the characteristic equation are $r = 1/2$ and $r = 3$.

10. Solve the following differential equation:

$$y'' - y = 2\sec 3x$$

For convenience the roots to the characteristic equation are $r = 1$ and $r = -1$.

11. Solve the following differential equation:

$$y'' - 4y = \sin^2 x$$

For convenience the roots to the characteristic equation are $r = 2$ and $r = -2$.

12. Given the following differential equation

$$2x^2y'' + 5xy' + 7y = 0$$

Use the following substitution

$$u = \ln x \text{ and } y = y(u)$$

to solve the differential equation.

13. Given the following differential equation

$$x^3y''' + 6x^2y'' + 7xy' + y = 0$$

Use the following substitution

$$u = \ln x \text{ and } y = y(u)$$

to solve the differential equation.