	Name:	
Math 3113 Section 003	Practice Exam 2	October 8, 2014

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. Consider the following functions: $y_1 = x$, $y_2 = x \ln x$, and $y_3 = x^2 \ln x$. Determine where y_1 , y_2 , and y_3 are linear independent.

2. Consider the following functions: $y_1 = x$, $y_2 = \cos(\ln x)$, and $y_3 = \sin(\ln x)$. Determine where y_1, y_2 , and y_3 are linear independent.

3. Solve the following differential equation:

$$2y'' - 7y' + 3y = 0$$

4. Solve the following differential equation:

$$9y'' + 6y' + 4y = 0$$

5. Use the method of undetermined coefficients to find the particular solution to the non-homogeneous equation and then write down the general solution.

$$y'' + 9y = 2x^2$$

The roots to the associated homogeneous equation are $r = \pm 3i$.

6. Use the method of undetermined coefficients to find the particular solution to the non-homogeneous equation and then write down the general solution.

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

The roots to the associated homogeneous equation are r = -1 and r = -2.

7. Use variation of parameters to find the particular solution to the nonhomogeneous equation and then write down the general solution.

$$y'' + 9y = 2\sec(3x)$$

The roots to the associated homogeneous equation are $r = \pm 3i$.

8. Use variation of parameters to find the particular solution to the nonhomogeneous equation and then write down the general solution.

$$y'' + y = \csc^2 x$$

The roots to the associated homogeneous equation are $r = \pm i$.

9. Let y_1 and y_2 be two linear independent solutions to the equation

$$a(x)y'' + b(x)y' + c(x)y = 0$$

for continuous nonzero functions a(x), b(x), and c(x). Let $w = W(y_1, y_2)$, i.e. the Wronskian of the solutions. Show that

$$a(x)\frac{dw}{dx} = -b(x)w$$

Can this resulting ODE be solved?