

Math 202  
Quiz # 2, December 4, 2009

NAME:

ID #:

Solve all 4 problems. Use both sides of each sheet of paper if necessary. No calculators allowed. Maximum time allowed is 60 minutes.

Problem # 1:

Problem # 2:

Problem # 3:

Problem # 4:

**Problem # 1.** ( 30 pts.) Find the general solution of the following differential equation

$$y^{(6)} - y'' = 3 + e^x.$$

**Problem # 2.** ( 25 pts.) Use the method of **variation of parameters** to find a particular solution of the following differential equation

$$x^2 y'' - 4xy' + 4y = 54x^{10}.$$

**Problem # 4.** ( 25 pts.) **(a)** Use an extended power series to find one non-trivial solution  $y_1$  of

$$y'' + \frac{1}{x}y' - 4y = 0.$$

(b) If  $y_1$  is a solution of the same equation in part (a), and  $y_2 = y_1 \ln x - w(x)$ , is another solution, find a second order differential equation satisfied by  $w$ .  
Remark: This part is independent of part (a).

**Problem # 3.** ( 20 pts.)  $J_3(x)$  is a solution of a particular second order differential equation. Write down that equation. Now answer the following question:

Prove that  $x^3 J_3(x)$  is a solution of the differential equation

$$xy'' - 5y' + xy = 0, x > 0.$$