Homework 5 (MATH 2310-04)   **Name (Print):**

Due date: Thursday, March 13, 2014

1. Determine whether the given functions form a fundamental set of solutions.

   a) $f(\theta) = \cos(2\theta) - 2\cos^2(\theta)$; $g(\theta) = \cos(2\theta) + 2\sin^2(\theta)$.

   b) $f(t) = e^{\lambda t}\cos(\mu t)$; $g(t) = e^{\lambda t}\sin(\mu t)$; $\mu \neq 0$.

2. Consider the differential equation

   $y'' + 8y' - 9y = 0$, $y(1) = 1$, $y'(1) = 0$.

   a) Find two solutions for this equation.

   b) Calculate the Wronskian to show that these two solutions form a fundamental set of solutions.

   c) Calculate the solution for the initial value problem by adopting the Wronskian for the calculation of c_1 and c_2.

3. Consider the differential equation

   $x^2 y'' - x(x+2)y' + (x+2)y = 0$, $y(1) = 1$, $y'(1) = 0$.

   a) Verify that two solutions are given by $y_1 = x$, $y_2 = x\,e^x$.

   b) Calculate the Wronskian to show that these two solutions form a fundamental set of solutions.

   c) Calculate the solution for the initial value problem by adopting the Wronskian for the calculation of c_1 and c_2.