**Department of Aerospace Engineering**

**AE602 Mathematics for Aerospace Engineers**

**Assignment No. 9**

**9.1** (a) Show that and are solutions of the reduced equation What is the general solution?

(b) Find and so that is a particular solution of the complete equation Use this solution and the result of part (a) to write down the general solution of this equation.

**9.2** By eliminating the constants and , find the differential equation of each of the following families of curves:

(a) ;

(b)

(c)

(e) .

**9.3** Show that is the general solution of

 On any interval, and find the particular solution for which and

**9.4** In each of the following, verify that the functions and are linearly independent solutions of the given differential equation on the interval , and find the solution satisfying the stated initial conditions:

(a) and , and

(b) and , and

**9.5** It is clear that and are two distinct pair of linearly independent solutions of . Thus, if and are linearly independent solutions of the homogeneous equations

We see that and are *not* uniquely determined by the equation.

1. Show that

and

So that the equation uniquely determined by any given pair linearly independent solutions.

1. Use (a) to reconstruct the equation from each of the two pairs of linearly independent solutions mentioned above.
2. Use (a) to reconstruct the equation in Problem 4 from the pair of linearly independent solutions ,

**9.6** Verify that is one solution of and find and the general solution.

**9.7** The equation is the special case of Legendre’s equation

Corresponding to It has as an obvious solution. Find the general solution.

**9.8** The equation is the special case of Bessel’s equation

Corresponding to . Verify that is one solution over any interval including only positive values of , and find the general solution.

**9.9** Verify that one solution of is given by , and find general solution.

**9.10** Find the general solution of each of the following equations:

(a)

(b)

(c)

(d)

(e)

(f)

**9.11** Find the solution of the following initial value problems:

(a) and

(b) and

**9.12** Find the general solution of each of the following equations:

(a)

(b)

(c)

(d)

(e)

**9.13** If and are solutions of

and

Show that is a solution of

This is called the Use this principle to find the general solution of

(a)

(b).

**9.14** Find a particular solution of

first by inspection and then by variation of parameters.

**9.15** Find a particular solution of

first by undetermined coefficients and then by variation of parameters.

**9.16** Find a particular solution of each of the following equations:

(a)

(b)

(c)

(d)