KF

Math 202 (071) Exam 2 (4.3-6.2)

Total Points: 25

Show your work. **Time: 90 min**

1. Solve $y''' - 4y'' + 5y' = 0$.

2. Find a differential operator that annihilates
$$\sin 2x + xe^x$$
and use it to determine the form of a particular solution for
$$y'' + 4y = 4\sin 2x + 5xe^x.$$

3. Determine the singular points of
$$(x^4 - 1)y'' + (x+1)y' + 2y = 0$$
and classify each point as regular or irregular.

4. Find the conditions and recurrence relations for the coefficients of power series solutions of $y'' + xy' + (x^2 + 2)y = 0$ about the ordinary point $x = 0$.

5. By substituting $y = \sum_{n=0}^{\infty} c_n x^n$ in a differential equation we obtain
$$2c_2 - c_0 + 6c_3 x + \sum_{k=2}^{\infty} \left[(k+1)(k-1)c_k - (k+2)(k+1)c_{k+2}\right]x^k = 0.$$
Find the general solution of that differential equation.

Distribution of points: Q1 = 4pt, Q2 = 5pts, Q3 = 4pts, Q4 = 6pts, Q5 = 6pts