Series Solutions Near Regular Singular Points: The Frobenius Method-
HW Problems

In problems 1-3 determine if $x = 0$ is an ordinary point, a regular
singular point, or an irregular singular point.

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

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

3. $x^3(1 + x^2)y'' + 2(1 + x^2)y' - 6x(1 - x)y = 0.$

4. Make a substitution to turn the singularity at $x = 1$ into a
singularity at $t = 0$. Then determine if the singuarity is regular.

   $(x^2 - 1)^2 y'' - x(x + 1)y' + 3y = 0.$

For problems 5-8 find two linearly independent solutions for $x > 0$.

5. $4xy'' + 2y' + 4y = 0$

6. $2x^2 y'' + xy' - (1 + 2x^2)y = 0$

7. $3x^2 y'' + x(1 + x)y' - y = 0$

8. $xy'' + (3 - x)y' - y = 0.$