

29:172 Assignment 11 - Due Wed, April. 25

- 1.) Use the series method to solve the second order differential equation with constant coefficients,

$$L\langle x|f\rangle = 0$$
$$L = \frac{d^2}{dx^2} + a\frac{d}{dx} + b$$

with boundary conditions

$$\langle 0|f\rangle = 1$$
$$\frac{d}{dx}\langle x|f\rangle|_{x=0} = 1$$

- b. What is the domain of analyticity of your solution?
- c. Put this equation in the form (14.6) (see K&D) and verify equation (14.12) for this example.
- 2.) Consider the differential equation

$$\frac{d^2}{dz^2}f(z) - f(z) = 0$$

Find recursion relations that define the coefficients of the two-independent power series solutions of this equation about $z = 0$.

- 3.) Consider the differential equation

$$\frac{d^2}{dz^2}f(z) + \sin(z)\frac{d}{dz}f(z) - \cos(z)f(z) = 0$$

Find recursion relations that define the coefficients of the two-independent power series solutions of this equation about $z = 0$.

- 4.) Consider the differential equation

$$\frac{d^2}{dz^2}f(z) + \frac{2}{z}\frac{d}{dz}f(z) - zf(z) = 0$$

Find the indicial equation for a solution about $z = 0$. Find the roots.

- 5.) Find the recursion relation that defines the coefficients of the series solution to the differential equation in problem 3) associated with the root of the indicial equation with largest real part.