Exercise 1

Consider the differential equation

\[(x - 1)y'' + 2y' = 0.\]  \hspace{1cm} (1)

(1) Find two linearly independent power series solutions around \(x_0 = 0\) of (1).

(2) Find the general solution of the DE (1).
Exercise 2

Consider the differential equation

\[ x y'' + y' + x y = 0. \]  \hspace{1cm} (2)

(1) Show that \( x_0 = 0 \) is a regular singular point of the DE (2).
(2) Find the Frobenius solution with the indicial root \( r = 0 \).