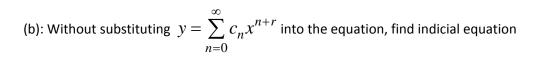Q1. Find a recurrence relation to find a series solution of $y'' + xy = 0$ about the ordinary point $x = 0$. Use this recurrence relation to find first four terms of series solution.

Q2.   Consider the differential equation $3xy'' + y' - y = 0$. Answer the following questions:

(a): Classify singularity at $x = 0$

(b): Without substituting $y = \sum_{n=0}^{\infty} c_n x^{n+r}$ into the equation, find indicial equation

(c):   Find roots of the indicial equation

(d): Does the given differential equation possess two linearly independent solutions?