$\Rightarrow C_{k+2} = \frac{k+1}{k+2} C_{k+1} \;,\; k = 1, 2, \ldots$

* We choose $c_0 = 1$ and $c_1 = 0$:

$$\text{So } C_2 = \frac{1}{2} \cdot 0 = 0$$

$$k = 1 \Rightarrow C_3 = \frac{1+1}{1+2} C_2 = 0$$

Since $C_2 = 0$ we have $C_3 = C_4 = C_5 = C_6 = \cdots = 0$.

Thus one Solution is: $y_1 = 1 + 0 + 0 + \cdots$

$$\Rightarrow \boxed{y_1 = 1}$$

* Choose $C_0 = 0$ and $C_1 = 1$ we get:

$$C_2 = \frac{1}{2} \cdot 1 = \frac{1}{2}$$

$$k = 1 \Rightarrow C_3 = \frac{2}{3} C_2 = \frac{1}{3}$$

$$k = 2 \Rightarrow C_4 = \frac{1}{4}$$

$$\text{So } y_2 = x + \frac{1}{2} x^2 + \frac{1}{3} x^3 + \frac{1}{4} x^4 + \cdots = \sum_{n=1}^{\infty} \frac{x^n}{n}$$

Hence we have two Solutions y_1 and y_2 of the DE (1).