

$$C_0 = 1$$

$$C_{n+1} = \frac{2(2n+1)}{n+2} C_n \quad \text{So} \quad (n+2)C_{n+1} = (4n+2)C_n$$

$$F = \sum C_n x^n$$

$$\frac{1}{x}(xF' + F - 1) = 4xF' + 2F$$

$$xF' + F - 1 = 4x^2F' + 2xF$$

$$(4x^2 - x)F' + 2xF - F + 1 = 0$$

$$l = \sum_{n=0}^{\infty} (n+2)C_{n+1}x^n$$

$$xl = \sum_{n=1}^{\infty} (n+1)C_n x^n = -1 + \sum_{n=0}^{\infty} (n+1)C_n x^n$$

$$xl + 1 = xF' + F$$

$$l = \frac{1}{x}(xF' + F - 1)$$