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$y = e^{x^2+x}$

$y' = (2x+1)e^{x^2+x}$

let $u = 2x+1 \quad v = e^{x^2+x}$

$\frac{du}{dx} = 2 \quad \frac{dv}{dx} = (2x+1)e^{x^2+x}$

$y'' = u\,dv/dx + v\,du/dx$

$= (2x+1)(2x+1)e^{x^2+x} + e^{x^2+x} \cdot 2$

$y'' = y'(2x+1) + 2y$

From Leibnitz theorem

$y'' - y'(2x+1) - 2y = 0$

$W_1 \quad W_2 \quad W_3$

$W_1 = y'' \quad W_2 = y'(2x+1) \quad W_3 = -2y$

$W_1 = y''$

$u^0 = y'' \quad , u' = y'''$

$v^0 = 1 \quad v' = 0$

$u^n = y^{n+2}$

$W_1^n = {}^nC_0 u^{n-0} v^0 + \cdots$

$W_1 = y^{n+2}$

$W_2 = y'(2x+1)$

$u^0 = y' \quad u' = y''$

$v^0 = 2x+1, \quad v' = 2$

$W_2^n = {}^nC_0 u^{n-0} v^0 + {}^nC_1 u^{n-1} v'$

$= y^{n+1}(2x+1) + n y^n$

$W_3 = 2y$

$u^0 = y \quad u' = y'$

$v^0 = 2 \quad v' = 0$

$u^n = y^n$

$W_3 = {}^nC_0 u^{n-0} v$

$W_3^n = 2y^n$

$W_1 + W_2 + W_3$

$y^{n+2} - y^{n+1}(2x+1) - 2n y^n - 2y^n = 0$