OBILOM CHIDERA
16/ENG04/068
ELECT/ELECT

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

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

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

(2ii) $y = x^3e^{4x}$ $y^5 = ?$

$v = x^3$, $v' = 3x^2$, $v'' = 6x$ $v''' = 6$ $v^4 = 0$

$u = e^{4x}$, $u^n = 4e^{ax}$; $u' = 16e^{4x}$; $u'' = 64e^{4x}$, $u^4 = 256e^{ax}$,

$u^5 = 1024e^{4x}$.

$\therefore y^5 = u^n v + nu^{n+1}v' + \frac{n(n-1)u^{n-2}v^2}{2!} + \frac{n(n-1)(n-2)v^3 u^{n-3}}{3!}$

$+ \frac{n(n-1)(n-2)(n-3)}{4!} u^{n-4}u^4$

$y^5 = 1024e^{4x}[x^3] + 15x^2[256e^{4x}] + 60x(64e^{4x}) + 60(16e^{4x})$

$y^5 = 64e^{4x}[16x^3 + 60x^3 + 60x + 15]$

(2iii) $x^2y'' + xy' + y = 0$

$W = x^2y''$

$v = x^2$; $v' = 2x$; $v'' = 2$

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

$W^n = u^n v + nu^{n-1}v' + \frac{n(n-1)u^{n-2}}{2!}v^2 + \frac{n(n-1)(n-2)}{3!}u^{n-3}v^3$

$W^n = x^2y^{n+2} + ny^{n+1} \cdot 2x + \frac{n(n-1)y^n}{2\times1} + 0$

$W^n = xy^{n+1} + ny^n$; $W = y$, $v = 1$, $u = y$, $v' = 0$, $u^n = y^n$

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

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

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

$dy/dx = (2x+1)e^{x^2+x}$

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

$= e^{x^2+x}[(2x+1)^2 + 2]$

$\therefore e^{x^2+x}[(2x+1)^2+1] = e^{x^2+x}[(2x+1)(2x+1)+2]$

$e^{x^2+x}[(2x+1)^2+2] = e^{x^2+x}[(2x+1)^2+2]$

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

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

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

$W = y''$

$V = 1 \quad V' = 0$

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

$W^n = u^n V + n u^{n-1} V'$

$= y^{2+n} + 0$

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

$V = 2x+1 \quad V' = 2 \quad V'' = 0$

$u = -y' \quad u^n = -y'^{+n}$

$\therefore W^n = u^n V + n u^{n-1} V' + \frac{n(n-1)}{2!} u^{n-2} V''$

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

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

$W = -2y$

$V = -2 \quad V' = 0$

$u = y \quad W^n = y^n$

$W^n = u^n V + n u^{n-1} V'$

$= y^n \cdot 2 + 0 = -2y^n$

$\therefore y^n = y'^{n+1} - y'^{n+1}(2x+1) + 2n(-y'^n) - 2y^n$