1) $(y'')^{\frac{2}{3}} = (1+y')^{\frac{1}{4}}$ 12. kuvvetini alalım

$(y'')^{8} = (1+y')^{3}$ 2. mertebe, 8. derece

lineer değil.

YANLIŞ

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2) $y\sin x\, dy = \cos x(\sin x - y^2)\, dx$

$$\frac{dy}{dx} = \frac{\cos x . \sin x - \cos x . y^2}{y . \sin x}$$

$$y' + (\cot x)y = \cos x . y^{-1}$$

$$y y' + (\cot x)y^2 = \cos x \qquad y^2 = z$$

DOĞRU

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3) $\underbrace{(3x-y^2)}_{P}\, dx - \underbrace{4xy}_{Q}\, dy = 0$

$P_y = -2y \qquad Q_x = -4y$

$$\frac{Q_x - P_y}{-Q} = \frac{-4y+2y}{+4xy} = \frac{-2\cancel{y}}{4x\cancel{y}} = \frac{-1}{2x}$$

$$\lambda = e^{-\int \frac{1}{2x}dx} = e^{-\frac{1}{2}\ln x} = x^{-\frac{1}{2}}$$

YANLIŞ

4) $4x^2y'' - 4xy' + 3y = 8x^{\frac{4}{3}}$ $\qquad x = e^t$

$y' = \frac{1}{x}\frac{dy}{dt} \qquad y'' = \frac{1}{x^2}\left(\frac{d^2y}{dt^2} - \frac{dy}{dt}\right)$

$4\frac{d^2y}{dt^2} - 4\frac{dy}{dt} - 4\frac{dy}{dt} + 3y = 8e^{\frac{4t}{3}}$

$4\frac{d^2y}{dt^2} - 8\frac{dy}{dt} + 3y = 8e^{\frac{4t}{3}}$

$4r^2 - 8r + 3 = 0$ $\qquad$ Kökler toplamı. 2

A

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5) $y'' + 2y' + y = 3e^{-x}\sqrt{1+x}$ $\qquad r^2 + 2r + 1 = 0 \quad r_1 = r_2 = -1$

$y_h = c_1e^{-x} + c_2xe^{-x}$ $\qquad y_p = c_1(x)e^{-x} + c_2(x)xe^{-x}$

$c_1'e^{-x} + c_2'(xe^{-x}) = 0$

$-c_1'e^{-x} + c_2'(e^{-x} - xe^{-x}) = 3e^{-x}\sqrt{1+x}$

$c_1' + c_2'x = 0$

$-c_1' + c_2'(1-x) = 3\sqrt{1+x}$

$+$

$c_2' = 3\sqrt{1+x}$ $\qquad c_1' = -3x\sqrt{1+x}$

B

6) $(1+x^2)y'' - 2xy' + 2y = x^3+3x$

$xy'-y$ kalıbı var $y_1 = x$ özel çözüm

$y = xu \qquad y' = u + xu' \qquad y'' = u' + u' + xu''$

$(1+x^2)(xu'' + 2u') - 2x(u + xu') + 2xu = x^3+3x$

$x(1+x^2)u'' + (2+2x^2-2x^2)u' + (-2x+2x)u$
$= x^3+3x$

$x(1+x^2)u'' + 2u' = x^3+3x$ D

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7) $y'' + xy' - 2y = 2 . \qquad y(0) = y'(0) = 0$

$s^2Y(s) - s\cancel{y(0)} - \cancel{y'(0)} - \frac{d}{ds}\left[sY(s) - \cancel{y(0)}\right] - 2Y(s) = \frac{2}{s}$

$s^2Y(s) - (Y(s) + sY'(s)) - 2Y(s) = \frac{2}{s}$

$(s^2-3)Y(s) - sY'(s) = \frac{2}{s}$

$sY'(s) - (s^2-3)Y(s) = -\frac{2}{s}$

$sY'(s) + (3-s^2)Y(s) = -\frac{2}{s}$

C

8) $(1+4x^2)y'' - 8y = 0$

$$y = \sum_{n=0}^{\infty} a_n x^n \qquad y' = \sum_{n=1}^{\infty} n a_n x^{n-1} \qquad y'' = \sum_{n=2}^{\infty} n(n-1) a_n x^{n-2}$$

$$\sum_{n=2}^{\infty} n(n-1) a_n x^{n-2} + \sum_{n=2}^{\infty} 4n(n-1) a_n x^n - \sum_{n=0}^{\infty} 8 a_n x^n = 0$$

$n \to n+2$

$$\sum_{n=0}^{\infty} (n+2)(n+1) a_{n+2} x^n + \sum_{n=2}^{\infty} 4n(n-1) a_n x^n - \sum_{n=0}^{\infty} 8 a_n x^n = 0$$

$$2a_2 + 6a_3 x - 8a_0 - 8a_1 x + \sum_{n=2}^{\infty} \left\{ (n+1)(n+2) a_{n+2} + (4n(n-1) - 8) a_n \right\} x^n = 0$$

$$(n+1)(n+2) a_{n+2} + (4n(n-1) - 8) a_n = 0$$

$2a_2 - 8a_0 = 0$

$6a_3 - 8a_1 = 0$

$$a_{n+2} = -\frac{4n(n-1) - 8}{(n+1)(n+2)} a_n$$

$$a_{n+2} = -\frac{4(n-2)}{n+2} a_n$$

$a_2 = 4a_0$

$a_3 = \frac{4}{3} a_1$

$$a_5 = -\frac{4 \cdot 1}{5} a_3$$

$$a_5 = -\frac{4}{5} \cdot \frac{4}{3} a_1 = -\frac{16}{15} a_1$$

C