Which of the following is the general solution of $y' + 4y = 0$ at $x = 0$ using the power series?

~~A)~~ $y = a_0(1 + 2x + 3x^2 + 4x^3 + \cdots)$

B) $y = a_0(1 - 4x + 2x^2 + 8x^3 + \cdots)$

C) $y = a_0(1 - 4x + 8x^2 - \frac{32}{3}x^3 + \cdots)$

D) $y = a_0(1 - 4x + \frac{1}{4}x^2 - \frac{3}{2}x^3 + \cdots)$

~~E)~~ $y = a_0(1 + 4x - 3x^2 - 6x^3 + \cdots)$

$a_1 = -4a_0$

$$y = a_0 + a_1 x + a_2 x^2 + \cdots$$

$-4a_0$

$$a_2 = -\frac{4a_1}{2} = -2(-4a_0) = 8a_0$$

$$y = \sum_{0}^{\infty} a_n x^n, \quad y' = \sum_{1}^{\infty} n a_n x^{n-1}$$

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

$$\sum_{0}^{\infty} (n+1) a_{n+1} x^n + \sum_{0}^{\infty} 4a_n x^n = 0 \Rightarrow \sum_{0}^{\infty} \left[(n+1) a_{n+1} + 4a_n\right] x^n = 0$$

$$a_{n+1} = -\frac{4a_n}{(n+1)}, \quad n \geq 0$$

Which of the following is the recurrence relation of $y'' - 4y' = 0$ at $x = 4$ using the power series?

~~A)~~ $a_{n+1} = 4\frac{a_{n-1}}{n} \quad (n \geq 1)$

B) $a_{n+1} = 4\frac{a_n}{(n+1)} \quad (n \geq 1)$

C) $a_{n+2} = 4\frac{a_n}{(n+2)} \quad (n \geq 2)$

D) $a_{n+2} = 4\frac{a_{n+1}}{n} \quad (n \geq 1)$

~~E)~~ $a_{n+1} = \frac{a_n}{(n+2)} \quad (n \geq 1)$

$$y = \sum_{0}^{\infty} a_n (x-4)^n$$

$$y' = \sum_{1}^{\infty} n a_n (x-4)^{n-1}$$

$$y'' = \sum_{2}^{\infty} n(n-1) a_n (x-4)^{n-2}$$

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

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

$$(n+1)\cancel{n} a_{n+1} = 4\cancel{n} a_n \Rightarrow \boxed{a_{n+1} = \frac{4a_n}{n+1}, \quad n \geq 1}$$

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

$n \geq 0$

The differential equation $x^3y''' - 2x^2y'' - 4xy' + 8y = x^2 + lnx$ is transformed into a differential equation with constant coefficients using a suitable transformation. Which of the following is the new differential equation?

$x = e^t$, $\ln x = t$ $\qquad D = \frac{d}{dt}$

$y' = e^{-t} Dy$

$y'' = e^{-2t} D(D-1)y$

$y''' = e^{-3t} D(D-1)(D-2)y$

A) $\frac{d^3y}{dt^3} - 5\frac{d^2y}{dt^2} + 8\frac{dy}{dt} = e^t + 2t$

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

C) $\frac{d^3y}{dt^3} - 5\frac{d^2y}{dt^2} + 8y = e^{2t} + t$

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

E) $\frac{d^3y}{dt^3} + 5\frac{d^2y}{dt^2} + 18y = e^{2t} - t$

$[\underbrace{D(D-1)(D-2) - 2D(D-1) - 4D + 8}]y = e^{2t} + t$

$D^3 - 3D^2 + \cancel{2D} - 2D^2 + \cancel{2D} - \cancel{4}D + 8$

$(D^3 - 5D^2 + 8)y$

If the two independent solutions of a fourth-order, homogeneous(non-second sided), linear differential equation are $\underline{1}$ and x^2e^{-x} , then which of the following is this differential equation?

$r(r+1)^3=0$

$y = c_1y_1 + \cdots + c_4y^4$

$\downarrow$ 1 $\quad \downarrow \; x^2e^{-x}$

A) $y^{(4)} + 3y''' + 3y'' + y' = 0$

B) $y^{(4)} - 3y'' - 2y' = 0$

C) $y^{(4)} + 3y''' - 2y' = 0$

D) $y^{(4)} - 3y''' + 3y'' - y' = 0$

E) $y^{(4)} + y''' - 2y' = 0$

$\boxed{y = e^{rx}}$

$\boxed{r_1 = 0}$

$r_2 = -1$

$r_3 = -1$

$r_4 = -1$

$(r^4 + r + 3r^3 + 3r^2) = 0$

$y^{iv} + 3y''' + 3y'' + y' = 0$

Which of the following is the general solution of $y^{(6)} + 4y^{(4)} + 3y'' = 0$?

a) $y = c_1 + c_2x + c_3\underline{x}\cos x + c_4\sin x + c_5x\cos\sqrt{3}x + c_6\sin\sqrt{3}x$

b) $y = c_1 + c_2x + c_3\cos x + c_4\underline{x}\sin x + c_5\cos\sqrt{3}x + c_6x\sin\sqrt{3}x$

c) $y = c_1 + c_2x + c_3\cos x + c_4\sin x + c_5\cos\sqrt{3}x + c_6\sin\sqrt{3}x$

d) $y = c_1 + c_2x + c_3\cos\underline{2x} + c_4\sin 2x + c_5\cos\sqrt{3}x + c_6\sin\sqrt{3}x$

e) $y = c_1 + c_2x + c_3\underline{x}\cos x + c_4x\sin x + c_5\cos\sqrt{3}x + c_6\sin\sqrt{3}x$

$r^6 + 4r^4 + 3r^2 = 0 \Rightarrow r^2(r^4 + 4r^2 + 3) = 0$

$(r^2+1)(r^2+3) = 0$

$r_1 = r_2 = 0$

$r_{3,4} = \mp i$

$r_{5,6} = \mp\sqrt{3}i$

$y_h = c_1 + c_2x + c_3\cos x + c_4\sin x + c_5\cos\sqrt{3}x + c_6\sin\sqrt{3}x$

$\boxed{\text{The solutions}}$ of the homogeneous(non-second handed) part of a differential equation with constant coefficients are given as $\sin x$, $cosx$ and 1. If the right side of this differential equation is $f(x) = 5x + e^{-x} - 2\sin x$, then which of the following gives the particular solution form of this equation?

$y_h \Rightarrow r_1 = 0$, $r_{2,3} = \mp i$

~~A)~~ $y_o = (ax + b) + Ae^{-x} + x(C\sin x + D\cos x)$

B) $y_o = (ax + b)x + Ae^{-x} + x(C\sin x + D\cos x)$

~~C)~~ $y_o = (ax + b)x + Axe^{x} + C\sin x + D\cos x$

~~D)~~ $y_o = (ax + b)x^2 + Ae^{x} + x(C\sin x + D\cos x)$

~~E)~~ $y_o = (ax + b)x + Ae^{-x} + x^2(C\sin x + D\cos x)$

$y_o = (ax+b)x + ke^{-x} + (A\cos x + B\sin x)x$

Which of the following is the solution form of the right-sided (non-homogeneous) of the differential equation $y''' - 2y'' + 2y' = e^{x}cosx + xsin3x$?

A) $y_{ö} = xe^{x}(Asinx + Bcosx) + (Cx + D)sin3x + (Ex + F)cos3x$

~~B)~~ $y_{ö} = e^{x}(Asinx + Bcosx) + (Cx + D)sin3x + (Ex + F)cos3x$

~~C)~~ $y_{ö} = x^2e^{x}(Asinx + Bcosx) + x[(Cx + D)sin3x + (Ex + F)cos3x]$

D) $y_{ö} = xe^{x}(Asinx + Bcosx) + x[(Cx + D)sin3x + (Ex + F)cos3x]$

~~E)~~ $y_{ö} = e^{x}(Asinx + Bcosx) + x[(Cx + D)sin3x + (Ex + F)cos3x]$

$r^3 - 2r^2 + 2r = 0 \Rightarrow r(r^2 - 2r + 2) = 0 \Rightarrow r_1 = 0$

$\nearrow -4$

$r_{2,3} = \dfrac{2 \mp \sqrt{4 - 4\cdot1\cdot2}}{2}$

$r_{2,3} = 1 \mp i$

$y_p = e^{x}[A\cos x + B\sin x]x + \cancel{E}\underset{(Cx+D)}{} \cos 3x + \cancel{D}\underset{(Ex+F)}{} \sin 3x$

Which of the following is the solution of the initial value problem $y''' - y'' - 6y' = 0$, $y(0) = 5,\ y'(0) = 0,\ y''(0) = 30$?

A) $y(x) = 3e^{2x} + 2e^{-3x}$

B) $y(x) = 3e^{-2x} + 2e^{3x}$

C) $y(x) = 2e^{-2x} + 3e^{3x}$

D) $y(x) = 3e^{-2x} - 2e^{3x}$

E) $y(x) = -2e^{-2x} + 3e^{3x}$

$y_g = y_h$

$r^3 - r^2 - 6r = 0$

$r(r^2 - r - 6) = 0$

$-3 \quad +2$

$r_1 = 0$

$r_2 = 3$

$r_3 = -2$

$y = c_1 + c_2 e^{3x} + c_3 e^{-2x}$

$y(0) = 5 \Rightarrow \boxed{c_1 + c_2 + c_3 = 5}$

$y' = 3c_2 e^{3x} - 2c_3 e^{-2x}$ $\quad y'(0) = \boxed{3c_2 - 2c_3 = 0}$

$y'' = 9c_2 e^{3x} + 4c_3 e^{-2x}$ $\quad y''(0) = \boxed{9c_2 + 4c_3 = 30}$

$c_2 = 2$

$c_3 = 3$

$c_1 = 0$

$y = 2e^{3x} + 3e^{-2x}$

Which of the following is the general solution of $3y^2y'' - 6y\,(y')^2 = 0$?

x missing

A) $y = c_1x^2 + c_2x$

B) $y = \frac{1}{c_1x^2 - c_2}$

C) $y = -\frac{1}{c_1x + c_2}$

D) $y = (c_1x + c_2)$

E) $y = c_1x^2 + c_2$

$y' = p \ ,\ y'' = p\frac{dp}{dy}$

$3y^2 p\frac{dp}{dy} - 6yp^2 = 0$

$\cancel{3y}p\left(y\frac{dp}{dy} - 2p\right) = 0$

1) $p = 0 \Rightarrow y = c$ Nothing g.s

2) $y\frac{dp}{dy} = 2p$

$\frac{dp}{p} = \frac{2dy}{y}$

$\ln p = 2\ln y + \ln c_1 \Rightarrow p = y^2 \cdot c_1$

$\frac{dy}{dx} = c_1 y^2 \Rightarrow \int \frac{dy}{y^2} = \int c_1\,dx$

$-\frac{1}{y} = c_1x + c_2$

$\boxed{y = -\frac{1}{c_1x + c_2}}$

$x, y', y'' \Rightarrow y$ missing

The differential equation $xy'' = (y')^2 Inx - y'$, $(x > 0)$ is transformed into a linear differential equation using a suitable transformation. Then which of the following is the new differential equation?

$y' = p$, $y'' = \frac{dp}{dx} = p'$

~~A)~~ $z' - e^x z = 1$

$xp' = p^2 \ln x - p$

~~B)~~ $z' + \frac{1}{x} z = e^x$

$p \to$ dep

~~C)~~ $z' + Inx\, z = x$

$x \to$ ind.

D) $z' + \frac{1}{x} z = \frac{Inx}{x} z^2$

$$p' + \frac{p}{x} = p^2 \frac{\ln x}{x}$$

E) $z' - \frac{1}{x} z = -\frac{Inx}{x}$

true answer is E, the question is about linear D.E. not bernoulli

When the general solution of $y'' + 4y = tan2x$ is written as $y = U(x)cos2x + V(x)sin2x$,

then which of the following is V' ?

$r^2 + 4 = 0 \Rightarrow r_{1,2} = \mp 2i$

$y_h = c_1 \cos 2x + c_2 \sin 2x$

A) $V' = \frac{-1}{2} cos2x$

B) $V' = \frac{1}{2} sin2x$

C) $V' = \frac{-1}{4} cos2x$

D) $V' = \frac{-1}{2} sin2x$

E) $V' = 2sin2x$

$2\sin 2x \,/\, U' \cos 2x + V' \sin 2x = 0$

$\cos 2x \,/\, -2U' \sin 2x + 2V' \cos 2x = \tan 2x$

$+$

$$V' [\underbrace{2\sin^2 2x + 2\cos^2 2x}_{2}] = \underbrace{(\tan 2x) \cos 2x}_{\sin 2x}$$

$$V' = \frac{\sin 2x}{2}$$

Which of the following system is used for the solution of the differential equation

$6y'' - y' - 12y = Arcsinx$?

~~A)~~ $c_1' e^{\frac{3}{2}x} + c_2' e^{\frac{-4}{3}x} = 0$ ve $\frac{3}{2} c_1' e^{\frac{3}{2}x} - \frac{4}{3} c_2' e^{\frac{-4}{3}x} = Arcsinx$

B) $c_1' e^{\frac{3}{2}x} + c_2' e^{\frac{-4}{3}x} = 0$ ve $\frac{3}{2} c_1' e^{\frac{3}{2}x} - \frac{4}{3} c_2' e^{\frac{-4}{3}x} = \frac{1}{6} Arcsinx$

~~C)~~ $c_1' e^{\frac{3}{2}x} + c_2' e^{\frac{-4}{3}x} = 0$ ve $\frac{3}{2} c_1' e^{\frac{3}{2}x} + \frac{4}{3} c_2' e^{\frac{-4}{3}x} = Arcsinx$

~~D)~~ $c_1' e^{\frac{3}{2}x} + c_2' e^{\frac{-4}{3}x} = 0$ ve $\frac{3}{12} c_1' e^{\frac{3}{2}x} - \frac{4}{18} c_2' e^{\frac{-4}{3}x} = \frac{1}{6} Arcsinx$

~~E)~~ $\frac{3}{2} c_1' e^{\frac{3}{2}x} - \frac{4}{3} c_2' e^{\frac{-4}{3}x} = 0$ ve $\frac{9}{4} c_1' e^{\frac{3}{2}x} + \frac{16}{9} c_2' e^{\frac{-4}{3}x} = Arcsinx$

$6r^2 - r - 12 = 0$

$3 \quad 4$
$2 \quad -3$

$(3r+4)(2r-3) = 0$

$r_1 = -\frac{4}{3} \qquad r_2 = \frac{3}{2}$

$y_h = c_1 e^{-\frac{4}{3}x} + c_2 e^{\frac{3}{2}x}$

$c_1' e^{-\frac{4}{3}x} + c_2' e^{\frac{3}{2}x} = 0$

$-\frac{4}{3} c_1' e^{-\frac{4}{3}x} + \frac{3}{2} c_2' e^{3/2\, x} = \frac{\arcsin x}{6}$

If the general solution of $y'' + ay' + by = 0$ is $y = e^{-x}(c_1 \sin 2x + c_2 \cos 2x)$, then what is the sum $a + b$?

$r^2 + ar + b = 0$ $\qquad$ $\boxed{r_{1,2} = -1 \mp 2i}$

A) 2 B) 5 C) 7 D)8 E)10

$r_1 + r_2 = -a$

$r_1 r_2 = b$

$\rightarrow (r - r_1)(r - r_2) = 0$

$\rightarrow r^2 - (r_1 + r_2) + r_1 r_2 = 0$

$r_1 + r_2 = -1 + 2i - 1 - 2i = -2 = -a \Rightarrow \boxed{a = 2}$

$(-1+2i)(-1-2i) = 1 + \cancel{2i} - \cancel{2i} \underbrace{- 4i^2}_{4} = 5 = b \quad \boxed{b = 5}$

Out of the lesson subject

The differential equation $y'' + 3y' + 2y = xe^{-x}$ is given. Then, which of the following is the reduced form of this differential equation?

A) $u'' - u' = x$ B) $u'' + u = x$ C) $u'' + u' = x$ D) $u'' - u = x$

E) $u'' + 2u' = x$

Which of the following is the coefficient of x^3 which appears in the power series $\sum_{n=0}^{\infty} a_n x^n$ of the differential equation $x\frac{d^2y}{dx^2} + y = 0$?

$x_0 = 0$

$a_3 = ?$

A) $\frac{2a_1}{5}$ B) $\frac{a_1}{12}$ C) $\frac{a_1 - a_0}{7}$ D) $\frac{-a_0}{6}$ E) $\frac{-a_0}{12}$

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

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

$$\sum_{1}^{\infty} (n+1)n\, a_{n+1} x^n + \sum_{0}^{\infty} a_n x^n = 0$$

$$\sum_{1}^{\infty}\left[n(n+1)a_{n+1} + a_n\right]x^n + a_0 = 0$$

$$a_{n+1} = -\frac{a_n}{n(n+1)} \qquad n \geq 1$$

$\Downarrow$

$$n = 2 \Rightarrow a_3 = -\frac{a_2}{3\cdot 2} = -\frac{1}{6}\left(-\frac{a_1}{2}\right) = \boxed{\frac{a_1}{12}}$$

$$n = 1 \Rightarrow a_2 = -\frac{a_1}{2\cdot 1}$$

Which of the following can NOT be the linearly independent solutions of the differential equation $y'' = 0$?

$y = c_1 + c_2 x$ $\qquad$ $1, \; x$

a) $\{5, \; 3x\}$

b) $\{5 + 2x, \; 3x\}$

c) $\{2, \; 3x^2\}$

d) $\{5 - x, \; 3\}$

e) $\{5x - 1, \; 2x\}$

$$\begin{vmatrix} 5 & 3x \\ 0 & 3 \end{vmatrix} = 15 \neq 0$$

$$\begin{vmatrix} 2 & 3x^2 \\ 0 & 6x \end{vmatrix} = 12x$$

$x \neq 0$ ✓

$x = 0$ ✗

x missing

The differential equation $y^3 y'' = y^2 y' + 2y(y')^2$ is transformed into a first order differential equation using a suitable transformation. Then, which of the following is the new form of this differential equation?

A) $yp' - p(y^2 - 2p) = 0$

B) $p(\, y^2 \frac{dp}{dy} - y - 2p) = 0$

C) $yp' - p(y^2 + 2py) = 0$

D) $p(\frac{dp}{dy} - y^2 - 2p) = 0$

E) $yp' + p(2y^2 - p) = 0$

$y' = p \; , \quad y'' = p \dfrac{dp}{dy}$

$$y^3 p \frac{dp}{dy} = y^2 p + 2yp^2 \Rightarrow p\cancel{y}\underbrace{\left[y^2 \frac{dp}{dy} - y - 2p \right]} = 0$$

When the general solution of $y''' + y' = \frac{1}{sin^3x}$ is searched as the form of $r^3 + r$

$y = c_1(x) + c_2(x)cosx + c_3(x)sinx$ according to *Variation of Parameters Method*, then which of the following is the $\boxed{c_3(x)}$ function?

a) $c_3(x) = cotx + k$

b) $c_3(x) = tanx + k$

c) $c_3(x) = secx + k$

d) $c_3(x) = cosecx + k$

e) $c_3(x) = cosx + k$

$$c_1' + c_2' \cos x + c_3' \sin x = 0$$

$$-c_2' \sin x + c_3' \cos x = 0 \quad /\cos x$$

$$-c_2' \cos x - c_3' \sin x = \frac{1}{\sin^3 x} \quad /\sin x$$

$$c_3' = \frac{-1}{\sin^2 x} \Rightarrow c_3 = k + \cot x$$

$$-\int cosec^2 x \, dx = \cot x$$

$x^2y'' + kxy' + y = \frac{1}{x}lnx$, $(x > 0, k \in \mathbb{R})$ is transformed into a differential equation with constant coefficients. If the particular (nonhomogeneous) solution form of this new equation is $y_ö = (at + b)t^2e^{-t}$, then what is the value of k ?

$x = e^t$

a) 0 b) 1 c) 2 d) 3 e) −1

$$D(D-1)y + kDy + y = e^{-t}t$$

$$[D^2 + (k-1)D + 1]y = te^{-t}$$

$$y_p = (at+b)e^{-t}$$

$$t^2 \Rightarrow \boxed{r_1 = r_2 = -1}$$

$$r^2 + (k-1)r + 1 = 0$$

$$r = -1 \Rightarrow 1 - (k-1) + 1 = 0$$

$$1 - k + 1 + 1 = 0$$

$$k = 3$$

$y' = f(ax+by+c) \qquad ax+by+c=u$

The differential equation $(1+y')\sin(x+y) = y'$ is transformed into a seperable differential equation using a suitable transformation. Which of the following is the new differential equation?

$y'[1-\sin(x+y)] = \sin(x+y)$

$y' = \frac{\sin(x+y)}{1-\sin(x+y)} = f(x+y)$

A) $u' = \frac{1}{1-sinu}$

B) $u' = \frac{1}{1+sinu}$

C) $u' = \frac{1}{1-cosu}$

D) $u' = \frac{1}{1+cosu}$

E) $u' = \frac{1}{1-sin^2u}$

$\left.\begin{aligned} x+y&=u \\ 1+y'&=u' \end{aligned}\right\}$ $\quad u' = \frac{\sin u}{1-\sin u}+1$

$u' = \frac{1}{1-\sin u}$

SORU 3. $y'' + Ky' + 4y = x^2e^x \quad y(0) = y'(0) = 0$ ~~başlangıç değer probleminin çözümü~~ $y = e^x(x^2+4x+6) + 2(x-3)e^{2x}$ ~~ise~~ K ~~sayısı kaçtır~~?

Rsolution ?

a) 4

b) 2

c) −4

d) −2

e) 0 CEVAP C

$\underbrace{y = e^x(x^2+4x+6)}_{y_p} + \underbrace{2(x-3)e^{2x}}_{y_h}$ $\quad \boxed{r=2}$

$r^2+kr+4=0$

$r=2 \Rightarrow 4+4+2k=0$

$k = -\frac{8}{2} = -4$

y missing linear d.e using a suit. trans.

SORU 4. $x^2y'' - (y')^2 + 3xy' = 0$ ~~Diferansiyel denklemi için uygun değişken dönüşümü yapılarak elde edilen~~ lineer diferansiyel ~~denklem aşağıdakilerden hangisidir~~?

a) $z' - 3\frac{z}{x} = -\frac{1}{x^2}$

b) $2z' + zx = 4$

c) $z' + \frac{z}{x} = 4$

d) $2z' + 4zx = 2$

e) $z' + z = x$

$y' = p \quad , \quad y'' = \frac{dp}{dx}$

$x^2 p' - p^2 + 3xp = 0$

$p' - \frac{p^2}{x^2} + \frac{3p}{x} = 0$

$\boxed{z' + \frac{3z}{x} = \frac{z^2}{x^2}}$

true answer

true answer is A, the question is about linear D.E. not bernoulli therefore, there is a true answer

error in the choice.

SORU 6. Cauchy-Euler ~~diferansiyel denklemi olduğu bilinen~~ $x^k y'' + xy' + y = kx+1$ ~~diferansiyel denklemi, uygun bir değişken dönüşümü ile aşağıdaki hangi sabit katsayılı denkleme dönüşür~~? use a suitable trans.

2 2

a) $\frac{d^2y}{dt^2} + y = 2e^t + 1$

b) $\frac{d^2y}{dt^2} + \frac{dy}{dt} - y = 2t + 1$

c) $\frac{d^2y}{dt^2} + y = 2e^t + 1$

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

e) $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} - y = t + 1$ (Cevap a)

$k = 2$

$x = e^t$

$D(D-1)y + Dy + y = 2e^t + 1$

$[D^2 - \cancel{D} + \cancel{D} + 1]\, y = 2e^t + 1 \Rightarrow y'' + y = 2e^t + 1$

yg

SORU 7. $y'' - 4y = lnx^4$ ~~diferansiyel denkleminin genel çözümü~~ $y = f(x)e^{3x} + g(x)e^{-3x}$ ~~şeklinde yazılıyor. Buna göre~~ $2f(x)'e^{3x} - g(x)'e^{-3x}$ ~~aşağıdakilerden hangisidir~~?

a) lnx

b) $2lnx$

c) 0

d) $\frac{2lnx}{e^{3x}}$

e) $4lnx$ Cevap b) 2lnx

$$2f'e^{3x} - g'e^{-3x}$$

$$f'e^{3x} + g'e^{-3x} = 0$$

$$+\ 3f'e^{3x} - 3g'e^{-3x} = \ln x^4$$

$$\frac{4f'e^{3x} - 2g'e^{-3x}}{2} = \frac{4\ln x}{2} \Rightarrow 2f'e^{3x} - g'e^{-3x} = 2\ln x$$

or

$$= \ln x^2$$

singular sol.

SORU 10. $y = xy' + Cos(y')$ ~~diferansiyel denkleminin tekil çözümü aşağıdakilerden~~ hangisidir?

a) $y = xArcsinx + \sqrt{1 - x^2}$

b) $y = xArcsinx - \sqrt{1 - x^2}$

c) $y = xArcsinx + \sqrt{1 + x^2}$

d) $y = xArccosx + \sqrt{1 - x^2}$

e) $y = xArccosx - \sqrt{1 + x^2}$

$$y' = p$$

$$\boxed{y = px + \cos p}$$

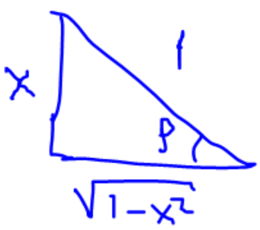
$$y' = p'x + \cancel{p} - p'\sin p$$

$$\cancel{p}$$

$$p'\left[x - \sin p\right] = 0$$

$$x = \sin p$$

$$y = p\sin p + \cos p$$



$$\boxed{y = x\arcsin x + \sqrt{1-x^2}}$$

SORU 11. $y''+2y'+y=te^{-t}$, $y(0)=-1$, $y'(0)=+2$ ~~başlangıç değer problemlerine~~

Laplace dönüşümü ~~uygulandığında elde edilecek ifade aşağıdakilerden hangisidi~~r?

a) $Y(s)=\dfrac{1}{(s+1)^4}+\dfrac{s}{(s+1)^2}$

b) $Y(s)=\dfrac{1}{(s-1)^4}-\dfrac{s}{(s-1)^2}$

c) $Y(s)=\dfrac{1}{(s+1)^4}-\dfrac{s}{(s+1)^2}$

d) $Y(s)=\dfrac{1}{(s-1)^4}-\dfrac{s}{(s+1)^2}$

e) $Y(s)=\dfrac{1}{(s+1)^4}-\dfrac{s}{(s-1)^2}$

$L\{te^{-t}\}=F(s+1)=\dfrac{1}{(s+1)^2}$

$L\{t\}=\dfrac{1}{s^2}=F(s)$

$s \quad 2+2$

2

$$s^2Y(s)-s\underbrace{y(0)}_{-1}-\underbrace{y'(0)}_{+2}+2\left[sY(s)-\underbrace{y(0)}_{-1}\right]+Y(s)=\frac{1}{(s+1)^2}$$

$$\big(\overbrace{s^2+2s+1}^{(s+1)^2}\big)Y(s)=\frac{1}{(s+1)^2}-s$$

$$Y(s)=\frac{1}{(s+1)^4}-\frac{s}{(s+1)^2}$$

Çöz

SORU 15. $f_1(t) = t^5 e^{-3t}$, $f_2(t) = e^{2t}\sin^2(3t)$ fonksiyonlarının Laplace dönüşümüleri mevcut olduğuna göre $L\left\{\frac{1}{5}f_1(t) + 2f_2(t)\right\}$ değeri aşağıdakilerden hangisidir?

a) $\frac{4!}{(s+3)^6} + \frac{1}{s-2} + \frac{2-s}{(s-2)^2+36}$

b) $\frac{5!}{(s-3)^6} - \frac{1}{s-2} + \frac{s-2}{(s-2)^2+6}$

c) $\frac{4!}{(s+2)^6} + \frac{1}{s+2} + \frac{2-s}{(s-2)^2+36}$

d) $\frac{5!}{(s+3)^6} + \frac{1}{s-2} - \frac{2-s}{(s-2)^2+36}$

e) $\frac{4!}{(s+3)^5} + \frac{1}{s-2} + \frac{2-s}{(s-2)^2+36}$

SORU 16. $y = (-x+4)y' + 2(y')^2$ Lagrange ~~diferansiyel denkleminin çözümü sırasında ortaya çıkan Lineer diferansiyel denklem aşağıdakilerden hangisidir?~~ Lineer !

a) $\frac{dx}{dp} + \frac{1}{2p}x = \frac{2}{p} + 2$

b) $\frac{dp}{dx} + \frac{1}{2x}p = \frac{x}{2}$

c) $\frac{dx}{dp} + 2x = \frac{p}{2} - 2$

d) $\frac{dx}{dp} - \frac{1}{2p}x = -\frac{p}{2} - 1$

e) $\frac{dx}{dp} - \frac{1}{4p}x = \frac{2}{p} + 2$

$y' = p$

$y = (-x+4).p + 2p^2$

$y' = -p + (-x+4)p' + 4pp'$

p

$2p = p'\,[4p - x + 4]$

$\frac{dp}{dx}$

$\frac{dx}{dp} = \frac{4p - x + 4}{2p}$

$\frac{dx}{dp} + \frac{x}{2p} = \frac{2p+2}{p} = 2 + \frac{2}{p}$

Çöz

SORU 20. $x\frac{d^2y}{dx^2}+y=0$ diferansiyel denkleminin $\sum_{n=0}^{\infty}a_n x^n$ şeklindeki kuvvet serisi çözümünde x^3 teriminin katsayısı aşağıdakilerden hangisidir?

A) $\frac{2a_1}{5}$

B) $\frac{a_1}{6}$ doğru

C) $\frac{a_1-a_0}{7}$

D) $\frac{-a_0}{6}$

E) $\frac{-a_0}{12}$

Çöz

SORU 19. $y''=1+(y')^2$ diferansiyel denkleminin genel çözümü aşağıdakilerden hangisidir?

a) $y=-\ln[\cos(x+c_1)]+c_2$

b) $y=\ln[\sin(x+c_1)]+c_2$

c) $y=-\ln[\sec(x+c_1)]+c_2$

d) $y=\ln(x+c_1)+c_2$

e) $y=\ln[x+c_1]+c_2x$

SORU 13. $u = u(x)$ve $v = v(x)$ olmak üzere $\begin{matrix} u' = 4u - v \\ v' = -4u + 4v \end{matrix}$ sisteminin çözümü aşağıdakilerden hangisidir?

a) $u(x) = c_1e^{2x} + c_2e^{6x}, \;\; v(x) = 2c_1e^{2x} - 2c_2e^{6x}$

b) $u(x) = c_1e^{-2x} + c_2e^{6x}, \;\; v(x) = 2c_1e^{-2x} - 2c_2e^{6x}$

c) $u(x) = c_1e^{2x} + c_2e^{-6x}, \;\; v(x) = 2c_1e^{2x} - 2c_2e^{-6x}$

d) $u(x) = c_1e^{-2x} + c_2e^{-6x}, \;\; v(x) = 2c_1e^{-2x} - 2c_2e^{-6x}$

e) $u(x) = c_1e^{2x} - 2c_2e^{6x}, \;\; v(x) = c_1e^{2x} + c_2e^{6x}$

$+D^2 \;\; 8D+12$

$-D^2 + 8D - 16 + 4$

$4 / \; (D-4)u + v = 0$

$D-4 / \; 4u + (D-4)v = 0$

$4v - (D^2 - 8D + 16)v = 0 \;\; \Rightarrow \;\; (D^2 - 8D + 12)v = 0$

$-6 \;\; -2$

$v = c_1e^{6x} + c_2e^{2x}$

$u = \dfrac{-(D-4)v}{4} = -\dfrac{1}{4}\left[6c_1e^{6x} + 2c_2e^{2x} - 4c_1e^{6x} - 4c_2e^{2x}\right]$

$-\dfrac{c_1}{2} = k_1$

$u = -\dfrac{c_1}{2}e^{6x} + \dfrac{c_2}{2}e^{2x}$

$\dfrac{c_2}{2} = k_2$

SORU 8. $y'^{V} + 2y''' - 3y'' - 4y' + 4y = tanx$ ~~diferansiyel denkleminin lineer bağımsız~~ ~~çözümlerinden biri~~ xe^{kx} ise k ~~nın alabileceği en büyük değer aşağıdakilerden hangisidir~~?

One of the lin. ind. solutions is

the biggest

a-) 1

b-) -1

c-) 2

d-) -2

e-) 0 Cevap A

$(r-1)^2 r (r+4) = 0$

$r^4 + 2r^3 - 3r^2 - 4r + 4 \;\big|\; r-1$

$-\; r^4 - r^3 \qquad r^3$

$3r^3 - 3r^2 - 4r + 4$

$= (r-1)r^3 + \underbrace{(3r^3 - 3r^2 - 4r + 4)}_{3r^2(r-1) - 4(r-1)}$

$= (r-1)\left[r^3 + 3r^2 - 4\right]$

$(r-1)(r^2 + 4r)$

$r^3 + 3r^2 - 4 \;\big|\; r-1$

$r^3 - r^2 \qquad r^2 + 4r$