1.2.1. [paqquirès_ sidyaphiès_ Ezravoeus_avurtepns_ toléns

Aok. Na Bpedei n Jevin Joon Ths DE y'''=0.ATI H DE Elvan objerns starting AE 3rd talins. Apa TO odobo Tur docen The show slow xwipos diadotains 3.

Example
$$y'''=0 \Rightarrow y''=c \Rightarrow y'=cx+c_0$$
 $\Rightarrow y = c_1x^2 + c_2x + c_3$, $c,c_1c_2,c_3 \in \mathbb{R}$.

Energy $y_1,y_2,y_3 = y_1,y_2,y_3 = 0$ 1 $2x = 2 \neq 0$

Or subsets $y_1 = 1, y_2 = x, y_3 = x^2$ Elvou represent a cuestoporators, stopulous arotelous plants on solon tou $\delta.x$. The subsetue counts the ΔE Apa in revision that $y(x) = c_1x^2 + c_2x + c_3$, $c_1,c_2,c_3 \in \mathbb{R}$. \square

2-1.6

AOX. Na Brecel n Jevin Joan ms Æ y' - 3y' + 2y = 0.AM. Moderne pa shakery sporthiky SE 2" Tolons. 0/0/00 00 35010 Woten the Eller d.x. diaotoens 2. Delha Zone mz

y=e Sum the g'=aeax Tôre y"=02e0x Kal OTISTE IN SE Maripuer on Mappy ae -3ae + 2 e = 0 => (a-3a+2)e = 0 => $a-3a+2=0 \Rightarrow a_1=1, a_2=2.$ INVERIOR BONKONER TO DUES Y=e, Y=e. Ensum $W(y_1, y_2) = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} e^x & e^{2x} \\ e^x & 2e^{2x} \end{vmatrix} = 2e^3 + e^3 + e^3 = e^4 = 0.$ Of 9,19 Elvan spagninals aretalounces. Apa n jeulin The SE Elvau y(x) = c1ex + Sex, c1, SeR.

Aok Nor Boedel in Jevikm John this DE $x^2y'' + xy' - y = 0$.

AM. Modrettan sta opropern spagning DE 2nd Tol Ins. Oriote to ochoso suremy The AE Eivan S.X. Sicilotano 2. Downsoure we soon the y = x ox. Tota $y' = \alpha x^{\alpha + 1}$ kar $y'' = \alpha(\alpha - 1) x^{\alpha - 2}$. Oriste n DE Maipre Th Mopper $x^{2} \alpha(\alpha - 1) x^{\alpha - 2} + x \alpha x^{\alpha - 1} - x^{\alpha} = 0 \Rightarrow$ $[a(a-1)+a-1]\times^{\alpha}=0 \Rightarrow \alpha(a-1)+a-1=0 \Rightarrow$ $a^2 - 2a + 2a - 1 = 0 \Rightarrow a^2 - 1 = 0 \Rightarrow a_1 = 1, a_2 = -1$

2.1.8

Dursied Ephroque 113 luoses y=x, y=x,

Ensuble $W(y_1, y_2) = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} x & x \\ 1 & -x^2 \end{vmatrix} = -x^{-1} - x^{-2} = -2x^{-1} \neq 0.$

01 à vossi y, y, sivou paperrais austolotres.

Apa n jeund zuon Tru DE Elvai

$$y(8) = Gx + Gx, \quad G, G \in \mathbb{R}$$

Acts. New Copedate of Jeyman Food Porce Ale

* Mobileagues Ins to 5ns

AOK. No Boscel njevikn 2000 ths
$$\Delta E$$

 $\chi^{2}(x+1)y'' - 2xy' + 2y = x^{3}, x > -1.$ (1)

yrupisorias on ny=x Elvai Zvon ths. AT. O Étage y=y,z => y=xz=> y=z+xz=> y"=1z+xz".

Drote n DE (1) Maipur Th Moppy $x^{2}(x+1)(9z'+xz'')-9x(z+xz')+9xz=x'=>$

$$2x^{3}z' + 2x^{2}z' + x^{4}z'' + x^{3}z'' - 2xz - 2x^{2}z' + 2xz = x^{3} \Rightarrow$$

$$(x^{4} + x^{3}) 2'' + 2x^{3} 2' = x^{3}$$
 (2)

Détaple
$$u = z'$$
. (3)

$$Z = U = \frac{1}{2} + C(x+1)^{2} \Rightarrow Z = \frac{2}{3} + C - \frac{1}{3} + C_{3} \Rightarrow Z = \frac{1}{3} + C_{1} + C_{1} \Rightarrow Z = \frac{1}{3} + C_{1} \Rightarrow Z = \frac{1}{3}$$

21.5

Aor. Na Boedel njevish toon the ΔE y'' + 2y' + y = 0

prompisores du n y=ex siran duon trs.

An Oètoupe $y=ze^{-x}=>y'=ze^{-x}-ze^{-x}=>$ $y''=z'e^{-x}-z'e^{-x}+ze^{-x}=z''e^{-x}+ze^{-x}$

Onote n DE majorer in Mopph

$$(ze^{-x}-9ze^{-x}+ze^{-x})+2(ze^{-x}-ze^{-x})+ze^{-x}=0=>$$

$$z''e^{-x} - 2ze^{-x} + ze^{-x} + 2ze^{-x} - 2ze^{-x} + ze^{-x} = 0 \Rightarrow$$

$$z''e^{-x} = 0 \Rightarrow z''=0 \Rightarrow z'=c_1 \Rightarrow z=c_1x+c_2, c_1,c_2 \in \mathbb{R}.$$

Apa n pevied abon this SE Elvau $y = ze^* \Rightarrow y = (c_1 x + c_2)e^*$, $c_1, c_2 \in \mathbb{R}$.

 Δ -9.9 _ Opereis_pappines_ ΔE _ pe_ orangeous_ auversoress. Aok. No Boschein review him this ΔE y'' - y' = 2y.

AT H DE production y''-y'-2y=0

Int. Elvou oposerns spappind DE 2" taisns pe oravepass authentes. H xapaitapionial ons estoman Elvou

 $\omega^2 - \omega - 9 = 0,$

n ordia éxel pises TIS $w_1 = -1$, $w_2 = 9$.

Apa n jeuled 2000 Ths DE Elvan

$$y = c_1 e^{-x} + \xi_2 e^{2x}$$

 $C_{L} \subset \mathbb{R}$

Apr. Na Boesein revisal soon on DE y'' + 2y' + 5y = 0.

ATH Xapakinplotted EStowen this SE Elvau $w^2 + 2w + 5 = 0$

n onoia èxel pises $w_{1,2} = -1 \pm 2i$.

Apa n jevien tion The SE Elvau

$$y = e^{-x}(c_1\cos 2x + \xi \sin 2x)$$

onou ciseR.

2.2.8

Aok. Na Boedel n jevien duan trus ΔE y'' + 2y' + y = 0.

An. H xapakinprotient estation Elvar $w^2 + 2w + 1 = 0$,

n onola Éxel pises TIS lu = lu = -1.

Apa n jeund 2000 The SE sivou

$$y = (c_1 + c_2 \times) \cdot e^{-x},$$

ònou 5,5 ∈ R. d. + 5/ + 2/ = 0

Aok Na Bredel n review rion this DE y''-y=0.

An. H xaparthplothed Extorum This DE Elvar $w^2 - 1 = 0$,

n onoia exer pises tis $w_1 = 1$, $w_2 = -1$.

Apa n jevien d'ion The SE Elvau

onou que el.

Aor. Na Bredei n jeund toon the ΔE y'' - 4y' + 5y = 0.

A. H xapartnplothed Estawon this DE Elvou $w^2 - 4w + 5 = 0$,

n onola éxel plJes tis $w_{1,2} = 2 \pm i$.

Apa n jevied tion the SE Elvau

$$y = e^{2x}(c_1\cos x + c_2\sin x),$$

ÔMOU GIGER.

Aok Na hudel to MAT

$$y'' + 6y' + 9y = 0$$
,

 $y(0) = 0$, $y'(0) = 2$.

AT H Xapakinplusion Estowon ins DE Eival W + 6w + 9 = 0n onoid exer pites $\omega_1 = \omega_2 = -3$ Apa n yeurn tuon Ths DE Elvou

$$y = (\zeta_1 + \zeta_1 \times) e^{-3x}$$
.
Etabri $y(0) = 0$, excepte
 $0 = (\zeta_1 + \zeta_2 \cdot 0) \cdot e^{-3x} = \zeta_1 = 0$.
Enlows $y'(0) = 2$, other
 $y' = \zeta_1 e^{-3x} = \zeta_2 \times e^{-3x} = \zeta_1 = 0$.
 $y' = \zeta_1 e^{-3x} = \zeta_1 = 0$.
 $y' = \zeta_1 e^{-3x} = \zeta_1 = 0$.
 $y' = \zeta_1 e^{-3x} = \zeta_1 = 0$.
 $y' = \zeta_1 e^{-3x} = \zeta_1 = 0$.
Apa in Straight when the prior when

Aon. Na Subsi to MAT
$$y'' + 9y = 0$$

$$y(0) = 0, \ y'(0) = 1.$$

An. H xaparenplotien ESTOUDN THE DE EIVOU $\omega^2 + 9 = 0$ n onoia éxel plJEs TIS W12= ± 3i. Apa n geulen Joon to DE Elvau

$$y = q\cos 3x + q \sin 3x$$
.
Eneally $g(0) = 0$, exorpre
 $0 = q\cos 0 + q \sin 0 \Rightarrow q = 0$.
Endons $g'(0) = 1$. Onote
 $y' = 3q\cos 3x \Rightarrow$
 $1 = 3\cdot q\cos 0 \Rightarrow q = \frac{1}{3}$.
Apa in Intorprevious reprodession tou Plat Eivon
 $y = \frac{1}{3}\sin 3x$.

Aor. Na Boeder n jevien won the DE y''' - y'' = y' - yAT H DE rodretae y''-y''-y'+y=0. H xapakanplotikh Estowan tru SE Elvau $\omega^3 - \omega^2 - \omega + 1 = 0 = >$ $\omega^{3} - \omega - \omega^{2} + 1 = 0 \Rightarrow \omega(\omega^{2} - 1) - (\omega^{2} - 1) = 0 \Rightarrow$ $(\omega^2-1)(\omega-1)=0\Rightarrow (\omega+1)(\omega-1)^2=0\Rightarrow \omega_1=-1, \omega_2=1.$ Apa n jevien d'on trus DE eivau $y = q\bar{e}^{x} + qe^{x} + qxe^{x},$ onou $q_{1}q_{2}q_{3}\in\mathbb{R}$.

Aok. Na Boedel n Jevilon 200n ths ΔE y''' - 4y'' + 9y' - 10y = 0.

ATT. H XOLDAKTAPIOTILON ESTOCUON TAS SE ENVOLUM $W^3 - 4w^2 + 9w - 10 = 0$

n onvia êxel pises tis $w_1 = 2$, $w_{2,3} = 1 \pm 2i$.

Apa n review Lion to SE Elvau

$$y = c_1 e^{2x} + ge^{2x} + ge^{2x}$$

ônd CIGGER.

Agr. Wa Bowled n review than this ΔE y''' - 3y' + 3y' - y = 0.

An H xaparanpiotinh Estowan this SE Elvau $w^3 - 3w^2 + 3w - 1 = 0 \Rightarrow$

 $(\omega-1)^3=0,$

n onoia exel pises $\omega_{1,2,3} = 1$.

Apa n jevied tion to SE sivai

 $y = c_1 e^x + c_2 x e^x + c_3 x^2 e^x = >$ $y = (c_1 + c_2 x + c_3 x^2) \cdot e^x,$

ônou cisoseR.

AOK. Na speciel n jevien won the DE
$$y^{(4)} + 2y^{(2)} + y = 0$$
.

AT. H Xapakapiotisal Estocuon this SE Elivar

$$w^4 + 2w^2 + 1 = 0$$

$$(\omega^2 + 1)^2 = 0$$

M orwid exer pises $w_{1,2} = w_{3,4} = \pm i$

Apa

$$y = C_1 + C_3 \times) \cdot \cos x + C_3 \times \sin x = >$$

 $y = (c_1 + c_3 \times) \cdot \cos x + (c_3 + c_4 \times) \cdot \sin x,$

òπου ς, ς, ς, ς, ∈ R.

2.3.a

A 9.3 Mn one pereis y apprintes. $\Delta E_{\mu e}$ or a deposite out the sore \pm Meason repositioned have one deposite \pm Mor species in yerism down this ΔE $y'' + y' - 2y = e^{3x}$

An H yevikh 2000 this DE Elvai this propopts $y = y_{o\mu} + y_{\mu}$

onou y_{op} in yeveral dions the availations operated AE y'' + y' - 2y = 0.

H xapaktnp1071kd e3102km Ths Elvau $w^2 + w - 2 = 0$

n orwide exemplses the $w_1 = -2$ kan $w_2 = 1$.

Zeverus

$$y_{0\mu} = c_1 e^{-2x} + c_2 e^{x}$$

ônou GIGER.

To 2° prévos no SE Elvai this judgens Pn(x)ekx µe n=0, k=3 kou to 3 Jev elvou pija trus xapa-Kanpiotims Estamons, orbite Snowles heriky your Lus hopens y_μ= ae³x aeR.

Tôte Exame $y' = 3\alpha e^{3x}$ $y'' = 9\alpha e^{3x}$

Avuadion Vas on SE προκυπεί $9\alpha e^{3x} + 3\alpha e^{3x} - 2\alpha e^{3x} = e^{3x} = >$ $9\alpha + 3\alpha - 2\alpha = 1 \Rightarrow 10\alpha = 1 \Rightarrow \alpha = \frac{1}{10}$ Apa $y_{\mu} = \frac{1}{10}e^{3x}$

Kou Etopuérus n Snowhern Yeural John this DE Oa envou $y=y_0+y_\mu=c_1e^2+se^4+be^3$; Snow $c_1, s_2 \in \mathbb{R}$. Agr. Na Bosels in your Auon this ΔE $y'' - 3y' + 2y = xe^{2x}.$

An H arrivorism offerens ΔE y'' = 3y' + 2y = 0

ÉXEL XAPARTIPIOTIRA E 310W5N

$$\omega^{2} + 3\omega + 2 = 0$$

n onala éxel piJes TIS

$$w_1=1$$
 was $w_2=2$

SUVENUS

ônou CII ER

To 2° métos Ths DE stray This papers Packler, µe n=1, k=2 kou to 2 Kou to 2 Elvou plJa (noktantionnas p=1) This xapakinplotibily etio., Oniste Intake hebby your in μορφής $y_{\mu} = x(\alpha x + \beta)e^{2x}$, α, βεR $y_{\mu}=(ax^2+Bx)e^{2x}$. Tôte Exame

 $y' = (20x + 6)e^{0x} + (0x^{2} + 6x) \cdot 2e^{0x} =$ $= [20x^{2} + 2(0x + 8)x + 8] \cdot e^{2x}$ $y'' = [4\alpha x + 2(\alpha + \beta)]e^{2x} + [2\alpha x^{2} + 2(\alpha + \beta)x + \beta]2e^{2x}$ $= [40x^{2} + 4(2a+b)x + 2a+4b]e^{2x}$ Apa $[40x^{2} + 4(2a+b)x + 2a+4b]e^{2x}$ $[40x^{2} + 4(2a+b)x + 2a+4b]e^{2x}$ $+[-60x^2-6(atb)x-36]e^{2x}$ $+2(\alpha x^2 + \beta x)e^{2x} = xe^{9x} = >$ 40x+80x+48x+20+48 -60x2,-60x-66x-38+20x+26x=X=> $2\alpha \times + 2\alpha + \beta = x \Rightarrow \begin{cases} 2\alpha = 1 \\ 2\alpha + \beta = 0 \end{cases} \Rightarrow \begin{cases} \alpha = \frac{1}{2} \\ \beta = -1 \end{cases}$ Apa $y_{\mu} = (\frac{1}{2}x^{2} - x)e^{2x}$ Kar $y = y + y = ce + ce + (\frac{1}{2}x^{2} - x)e^{2x}$ AOK. Na Bossel n yevism toon this ΔE : $y'' - 4y' + 5y = e^{-x}.$

An Harriotoin quojents ΔE y''-4y'+5y=0, ÈXEL XOPOLKINPIUTIEM ESTOCEON $\omega^2 - 4\omega + 5 = 0$, n onotol êxel piJes W1,2 = 2± E. Tursned $y_{op} = e(\zeta_{0} + \zeta_{0} + \zeta_{0} + \zeta_{0})$, $\zeta_{1} = e(\zeta_{0} + \zeta_{0} + \zeta_{0} + \zeta_{0})$, $\zeta_{2} = e(\zeta_{0} + \zeta_{0} + \zeta_{0} + \zeta_{0})$. To 2° péros this SE sivou this properts $f_{n}(x) = e^{kx}$ pre To 2° péros this SE sivou this properts $f_{n}(x) = e^{kx}$ n=0, k=-1 kau to -1 Sev Eivau piJa ths xapakthpiotikh E 310. OTTÈTE ZNOCIUE MEDILAI 2000 TOS MOPGES $y_{\mu} = \alpha e^{-x}$, $\alpha \in \mathbb{R}$.

$$y'_{\mu} = -\alpha e^{-x}$$

Arthadiothras our SE repordates

$$100 = 1 \implies 0 = \frac{1}{10}$$

$$A_{\mu} = \frac{1}{10}e^{-x}$$

Kou Enquèves n Involpreun Jeulkn Juon mo DE Da Eivou

ADK. No. XUDE! TO MAT

$$y'' - 4y' + 4y = e^{x}$$
,
 $y(0) = 0$, $y'(0) = 2$.

An Havilorouxn openions DE y'' - 4y' + 4y = 0ÈXEL XAPAKTIPIOTIM E E 10000 $w^2 - 4w + 4 = 0$

This ortolars of pises Elvau $W_1 = W_2 = 2$.

Zuveruis $y_{o\mu} = (c_1 + g_x)e^{2x}, q_i gelR$ To 2° MENOS TOS DE (TO ex) Elvou ons propoper's P(x)-exx me n=0, k=1 kou to 1 fev Elvou pisa The Xapakthplothy ESIDUM D'OTE $y_{\mu} = \alpha e^{x}, \alpha \in \mathbb{R}.$ Ynotox1 Soque $y'_{\mu} = ae^{\times}$ y" = aex.

ANTIHORDIARDINOS OTO DE ROJUNTER

$$\alpha e^{x} - 4\alpha e^{x} + 4\alpha e^{x} = e^{x} \Rightarrow \alpha = 1$$
.

Apa $y_{\mu} = e^{x}$

FOR ETOPIÈNUS $y = y + y = (\zeta + \zeta x)e^{1/2} + e^{-x}$

Energy (0) = 0

$$0 = (c_1 + c_2 \cdot 0) e^0 + e^0 = 0$$

$$0 = c_1 + 1 = 0$$

$$c_1 = -1.$$

YnuxoyiJouré y'= Gex+(-1+gx)2e2x+ex=> $y' = (-9 + 6 + 26 \times)e^{2x} + e^{x}$ Eneigh (10)=2, exame $2 = (-2 + \zeta_0 + 2\zeta_0.0)e^{2} + e^{2} = >$ $2 = -2 + 6 + 1 \Rightarrow 6 = 3.$ Apa n Intoupern MEDILA Juon nou iravonoisi Tis Sobeloes ound thes educa

Sodeloes our Hires envou $y = (-1+3.x)e^{2x} + e^{x}$

Aox, Na Boeder in Jevikol From this ΔE y'' - 4y' + 5y = sln3x

An. H arriatorm opagerns SE y'' - 4y' + 5y = 0Exer xapaktnolotikal extorum

 $w^2 - 4w + 5 = 0$ This onolas of pises elver $w_{1,2} = 2 \pm i$.

Zurenws

 $y = e^{2x} (c_1 c_0 x + c_2 x x), c_1 c_0 R$ To 2° µElos Ths DE (SIn3x) Ervou ths properts exx (Ph. cosmx + Ph. Sin mx) $\mu \epsilon = 0, k = 0, m = 3$ Kou to k tim = ±3i SEV EIVOY piza the xaparthologisms esto. OROTE $y_{\mu} = \alpha sin^3x + 6 \cos^3x$, a, b=R YMOLOGI JOULE

2.3.1

$$y'' = 30\cos 3x - 36\sin 3x,$$
 $y'' = -9a\sin 3x - 96\cos 3x.$

AVII Kadiawinous orn DE MOORDITER

$$-9a \sin 3x - 96 \cos 3x - 12a \cos 3x + 126 \sin 3x + 5a \sin 3x + 56 \cos 3x = \sin 3x$$

$$(-4a+19B) \sin 3x + (-12a-4B)\cos 3x = \sin 3x \Rightarrow$$

$$-4\alpha + 12\beta = 1 = -4\alpha + 12\beta = 1 = 0$$

$$-12\alpha - 4\beta = 0$$

$$-36\alpha - 12\beta = 0$$

$$-36\alpha - 12\beta = 0$$

$$-36\alpha - 12\beta = 0$$

$$-12a - 4B = 0 \int_{-36a}^{-36a} -12B = 0 \int_{-36a}^{-36a} = 0 \int_{-3$$

$$Apa$$
 $y_{\mu} = -\frac{1}{40} \sin 3x + \frac{3}{40} \cos 3x$

Kou Stopelus
$$y = y_{op} + y_{\mu} = e^{2x} (c_1 cos x + c_2 sin x) - \frac{1}{40} sin 3x + \frac{3}{40} cos 3x.$$

giou c, GeR.

ADR. Na BOEDER n JEVIAN Julon on DE $y'' + y = x \cos x$ An It arrivorous augents SE y'' + y = 0ÈXEL XOLDAKTIPOLOTILA EZIOLOM $\omega^2 + 1 = 0$ The analog of piles. Elvan $\omega_{12} = \pm ($

ZURNUS You = C, COSX + C, SINX ONOU C1, GER. To 2° µEXOS TRS DE (XCOSX) Sivou this puopen's $e^{kx}\left(P_{h}(x)cosmx + P_{h}(x)slnmx\right)$ $\mu \in N_1=1, k=0, m=1$ Kou to k+ml= i <u>Elvar</u> pisa Ths Xapartholotikas Ezibruons. Unióre $y = x(\alpha + \beta x)\cos x + x(\gamma + \delta x)\sin x$ onou $\alpha, \beta, \gamma, \delta \in \mathbb{R}$.

Yrotoph Jayre The 1" kar 2" mapazerso:

$$y'_{\mu} = \left[3x^{2} + (2b+y)x + a \right] \cos x + \left[-6x^{2} + (2b-a)x + y \right] \sin x,$$

$$y''_{\mu} = \left[-6x^{2} + (4b-a)x + 2(b+y) \right] \cos x + \left[-5x^{2} + (-4b-y)x + 2b-a \right] \sin x.$$

$$2(B+y)\cos x + 2(J-a)\sin x - 4B \times \sin x + 4J \times \cos x = x\cos x \Rightarrow$$

$$2(8+7) = 0$$
 $2(8-7) = 0$
 $3 = 4$
 $3(8-7) = 0$
 $3 = 4$
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Apa
$$y_{\mu} = \frac{1}{4} \times^2 \sin x + \frac{1}{4} \times \cos x$$

Kou etoperus

$$y = y_{qu} + y_{\mu} = C_1 \cos x + \zeta \sin x + \frac{1}{4} x^2 \sin x + \frac{1}{4} x \cos x.$$

Onou CLIGER.

Maparnonan: Av to Seitepo mistos ons DE strau allonopia ôprev ons prapageds ers(P(x)comx+P(x)slnmx), Tore Interpretation appointments TUN artiotoixun prepircel sioseen.

AOK. Na Boedel n gener won

The AF $y'' + 9y = e^x - 1$.

An It artiotown operations AE y'' + 9y = 0Exer xapakrinorotizal estrum $w^2 + 9 = 0$ This orioids of pises elvou $w_{1,2} = \pm 3i$.

DUVERUUS $y = c_1 \cos 3x + s_2 \sin 3x.$ $y = c_1 \cos 3x + s_2 \sin 3x.$

To 2° µèros ms AF (e²-1) Elveu al Doorquai épeur ex(Pn(x) cosmx+ Pn(x) sinmx),

Orbite Snague xions soms papers
$$y_{\mu} = ae^x + B$$
, $a_{\mu}BelR$.

Ynskopi Jayee

$$y'_{\mu} = \alpha e^{\times},$$
 $y''_{\mu} = \alpha e^{\times}.$

Artikaliotwitas oth DE, repainted

$$ae^{x} + 9(ae^{x} + 6) = e^{x} - 1 =>$$

$$10ae^{x} + 98 = e^{x} - 1 = >$$

$$\Rightarrow \begin{cases} 10\alpha = 1 \\ 9\beta = -1 \end{cases} \Rightarrow \begin{cases} \alpha = \frac{1}{10}, \\ \beta = -\frac{1}{9}. \end{cases}$$

Apa

$$y_{\mu} = \frac{1}{10}e^{x} - \frac{1}{9}$$

Kou Eropièrus

$$= (\cos 3x + \cos 3x$$

Onou
$$C_1, C_2 \in \mathbb{R}$$
.

#Médosos μεταβολης των σταθερών Παραδ. Να βρεθεί η γενική λύση της ΔΕ y'' + y = tanx.

An H xapakinplother és lower ins avriotoisms quojevous ΔE Elvou $\omega^2 + 1 = 0$

n onois èxel pises $w_{1,2} = \pm i$.

 $y_{qu} = G_1 \cos x + G_2 \sin x$

orrow or $y_1(x) = \cos x$ kou $y(x) = \sin x$ sivou δv_0 praprimus avesoprates hims the aviiotolishs operations ΔE .

```
Zhowhe heaves from y_{\mu} this happens y_{\mu} = c_1(x)y_1(x) + c_2(x)y_2(x)
                                          \Rightarrow y_{\mu} = c_{\mu}(x)\cos x + \varsigma(x)\sin x.
  ônou or a rou d'uspisonan aré un suithau and man anatharon
G'(Sin x + cos^2 x) = cos x tan x \Rightarrow G' = cos x \cdot \frac{sin x}{cos x} \Rightarrow G' = sin x \Rightarrow G = -cos x
 C_1 = -\int \frac{\sin x}{\cos x} dx = -\int \frac{1 - \cos^2 x}{\cos x} dx = \int \cos x dx - \int \frac{1}{\cos x} dx = \sin x - \ln \left( \frac{1}{\cos x} + \tan x \right).
  Orbite y_{\mu} = c_1(x) \cdot \cos x + c_2(x) \sin x = \sin x \cos x - \cos x \ln \left(\frac{1}{\cos x} + \tan x\right) - \cos x \sin x
            y = y_{o\mu} + y_{\mu} = C_1 \cos x + C_2 \sin x - \cos x \ln(\frac{1}{\cos x} + \tan x).
  Apa
```

2.3.7

Magad. Na Goedei n jevilm toon the DE $y'' - 2 \cdot y' + 2y = \frac{1}{2}y = \frac{1}{2}$ av proposague suo divers $y(x) = \dot{x}$, kau $y_2(x) = \chi^2$ This autionous oposevous DE. Energy $W(y_1,y_2) = \begin{vmatrix} y_1 & y_2 \\ y_1' & y_2' \end{vmatrix} = \begin{vmatrix} x & x^2 \\ 1 & 2x \end{vmatrix} = 2x^2 - x^2 = x^2 \neq 0$.

Zntaine mephal hoon yeth proppels $y_{\mu} = C_{1}(x) y(x) + C_{2}(x) y_{2}(x) \implies$ $y_{\mu} = C_{1}(x) x + C_{2}(x) x^{2}$

ônou or a kou o repostopisoral artin Erituon rou avort matus

$$\frac{G' \times + G' \times^{2} = 0}{G' + G' 2x = \frac{\ln x}{X}} \int_{-\infty}^{2.3.0} \frac{|0| \times |2|}{|x| \times |2|} = \frac{-x \ln x}{|x| \times |x|} = -\frac{\ln x}{x}$$

$$C_{2} = \frac{\frac{|X|}{|1|} \frac{|N|}{|X|}}{\frac{|X|}{|1|} \frac{|N|}{2|X|}} = \frac{|N|X-0}{2|X^{2}-X^{2}|} = \frac{|N|X}{|X|}.$$
 Oxokánpiúvovas Thu 1º oxeón

$$C'_{1} = -\frac{\ln x}{x} \Rightarrow C(x) = -\int \frac{\ln x}{x} dx = -\int \ln x (\ln x) dx = -\frac{(\ln x)^{2}}{2}$$

Otokhopivoras in 2° oxean

$$c_{2}' = \frac{\ln x}{x^{2}} \Rightarrow c_{2}(x) = \int \frac{\ln x}{x^{2}} dx = -\int \ln x \left(\frac{1}{x}\right) dx = -\frac{\ln x}{x} + \int \frac{1}{x} \frac{1}{x} dx$$

$$= -\frac{\ln x}{x} + \int \frac{-2}{x} dx = -\frac{\ln x}{x} - \frac{1}{x} = -\frac{1 + \ln x}{x}. \text{ Apa } y = c_{1}x + c_{2}x^{2} - \frac{\ln x^{2}}{x} - \frac{1 + \ln x}{x}.$$