

$$x'' + x = 3 \sin t$$

(1) 1

$$x_h(t) = c_1 + c_2 e^{-t}$$

פתרון הומוג'ני (5)

הומוג'ני

$$x(t) = u_1(t)x_1(t) + u_2(t)x_2(t)$$

$$x'(t) = u_1' \cdot x_1 + u_1 \cdot x_1' + u_2' \cdot x_2 + u_2 \cdot x_2'$$

$$(5) \quad u_1' \cdot x_1 + u_2' \cdot x_2 = 0$$

$$x'(t) = u_1' x_1 + u_2' x_2$$

$$x''(t) = u_1'' x_1 + u_1' x_1' + u_2'' x_2 + u_2' x_2'$$

כאן

$$u_1'' x_1 + u_1' x_1' + u_2'' x_2 + u_2' x_2' + u_1' x_1 + u_2' x_2 = 3 \sin t$$

$$u_1'' x_1 + u_2'' x_2 + u_1' (x_1' + x_1) + u_2' (x_2' + x_2) = 3 \sin t$$

$$u_1' \cdot 0 + u_2' \cdot c_2 \cdot (-e^{-t}) = 3 \sin t$$

הוא קביל

$$c_1 u_1' + c_2 e^{-t} u_2' = 0$$

$$-c_2 e^{-t} u_2' = 3 \sin t \Rightarrow u_2' = -\frac{3}{c_2} e^t \sin t$$

$$u_2 = -\frac{3}{c_2} \int e^t \sin t dt = \begin{matrix} v=e^t & w=\sin t \\ v'=e^t & w'=\cos t \end{matrix}$$

u2 נכונה

$$= \frac{3}{c_2} [e^t \sin t - \int e^t \cos t] = \begin{matrix} v=e^t & w=\cos t \\ v'=e^t & w'=-\sin t \end{matrix}$$

$$\Rightarrow \frac{3}{c_2} [e^t \sin t - e^t \cos t - \int e^t \sin t] \Rightarrow \boxed{u_2 = \frac{3}{c_2} \frac{e^t \sin t - e^t \cos t}{2}}$$

$$u_1' = \frac{-x_2 \cdot \frac{g(t)}{p(t)}}{w} = \frac{-c_2 e^{-t} \cdot 3 \sin t}{c_1 c_2 e^{-t}} = \frac{3}{c_1} \sin t$$

$$\boxed{u_1 = \frac{3}{c_1} \int \sin t dt = -\frac{3}{c_1} \cos t}$$

כאן הומוג'ני

$$x(t) = c_1 + c_2 e^{-t} - \frac{3}{c_1} \cos t \cdot c_1 - \frac{3}{2} \cdot \frac{e^t}{c_2} (\sin t - \cos t) \cdot c_2 e^t$$

$$x(t) = c_1 + c_2 e^{-t} - 3 \cos t - \frac{3}{2} \sin t + \frac{3}{2} \cos t$$

$$x(t) = c_1 + c_2 e^{-t} - \frac{3}{2} \cos t + \frac{3}{2} \sin t$$

$$1. (a) \quad x'' + x = te^t + 2e^{-t}$$

$$x_h(t) = c_1 \cos t + c_2 \sin t$$

הצגת הפונקציה הכללית

$$W(x_1, x_2) = \begin{vmatrix} c_1 \cos t & c_2 \sin t \\ -c_1 \sin t & c_2 \cos t \end{vmatrix} =$$

הצגת הפונקציה הכללית

$$= c_1 c_2 \cos^2 t + c_1 c_2 \sin^2 t = \underline{\underline{c_1 c_2}}$$

$$x_p(t) = u_1(t) \cdot x_1(t) + u_2(t) \cdot x_2(t)$$

הצגת הפונקציה הכללית

$$u_1' = \frac{-c_2 \sin t \cdot (te^t + 2e^{-t})}{c_1 c_2} =$$

$$= -\frac{1}{c_1} [te^t \sin t + 2e^{-t} \sin t]$$

הצגת הפונקציה הכללית

$$u_1 = -\frac{1}{c_1} \int te^t \sin t dt - \frac{2}{c_1} \int e^{-t} \sin t dt$$

$$\int te^t \sin t dt = \begin{matrix} u(t) = te^t & v(t) = -\cos t \\ u'(t) = e^t + te^t & v'(t) = \sin t \end{matrix} = -te^t \cos t + \int e^t \cos t dt + \int te^t \cos t dt \quad \ominus$$

$$\int e^t \cos t dt = \begin{matrix} u(t) = e^t & v(t) = \cos t \\ u'(t) = e^t & v'(t) = -\sin t \end{matrix} = e^t \cos t + \int e^t \sin t dt$$

$$\int te^t \cos t dt = \begin{matrix} u(t) = te^t & v(t) = \sin t \\ u'(t) = e^t + te^t & v'(t) = \cos t \end{matrix} = te^t \sin t - \int te^t \sin t dt - \int e^t \sin t dt$$

$$\ominus -te^t \cos t + e^t \cos t + \int e^t \sin t dt + te^t \sin t - \int te^t \sin t dt - \int e^t \sin t dt$$

$$\int e^{-t} \sin t dt = \begin{matrix} u = e^{-t} & v = \sin t \\ u' = -e^{-t} & v' = \cos t \end{matrix} = -e^{-t} \sin t + \int e^{-t} \cos t dt = \begin{matrix} u = -e^{-t} & v = \cos t \\ u' = e^{-t} & v' = -\sin t \end{matrix} =$$

$$= -e^{-t} \sin t - e^{-t} \cos t - \int e^{-t} \sin t dt$$

$$\Rightarrow u_1 = -\frac{1}{2c_1} [e^t \cos t - te^t \cos t + te^t \sin t] + \frac{2}{c_1} \cdot \frac{1}{2} [e^{-t} \cos t + e^{-t} \sin t]$$

$$u_1 = -\frac{1}{2c_1} [-te^t \cos t + (e^t - 2e^{-t}) \cos t + te^t \sin t - 2e^{-t} \sin t]$$

$$u_2' = \frac{x_1 \cos t \cdot (te^t + 2e^{-t})}{x_1 \cdot c_2} = \frac{1}{c_2} [te^t \cos t + 2e^{-t} \cos t]$$

$$\int te^t \cos t dt = \begin{matrix} u = te^t & v(t) = \sin t \\ u' = e^t + te^t & v'(t) = \cos t \end{matrix} = te^t \sin t - \int \sin t \cdot e^t dt - \int te^t \sin t dt \quad \ominus$$

$$\int e^t \sin t dt = \begin{matrix} u = e^t & v = \sin t \\ u' = e^t & v' = \cos t \end{matrix} = e^t \sin t - \int e^t \cos t dt$$

... (2) (1) plm

$$\ominus t e^t \sin t - e^t \sin t + \int e^t \cos t dt + t e^t \cos t - \int e^t \cos t dt - \int t e^t \cos t$$

$$\int e^{-t} \cos t dt = \boxed{\begin{matrix} u = -e^{-t} & v = \cos t \\ u' = e^{-t} & v' = -\sin t \end{matrix}} = -e^{-t} \cos t - \int e^{-t} \sin t dt = \boxed{\begin{matrix} u = -e^{-t} & v = \sin t \\ u' = e^{-t} & v' = \cos t \end{matrix}}$$

$$= -e^{-t} \cos t + e^{-t} \sin t - \int e^{-t} \cos t dt$$

$$u_2 = \frac{1}{2c_2} [ t e^t \sin t - e^t \sin t + t e^t \cos t - 2 e^{-t} \cos t + 2 e^{-t} \sin t ]$$

$$\boxed{u_2 = \frac{1}{2c_2} [ t e^t \sin t + (2e^{-t} - e^t) \sin t + t e^t \cos t - 2e^{-t} \cos t ]}$$

$$x(t) = c_1 \cos t + c_2 \sin t - \frac{1}{2} [ -t e^t \cos t + (e^t - 2e^{-t}) \cos t + t e^t \sin t \cos t - 2e^{-t} \sin t \cos t ]$$

ihnon p1

$$+ \frac{1}{2} [ t e^t \sin^2 t + (2e^{-t} - e^t) \sin^2 t + t e^t \cos^2 t \sin t - 2e^{-t} \cos^2 t \sin t ]$$

$$\boxed{x(t) = c_1 \cos t + c_2 \sin t + \frac{1}{2} t \cdot e^t + e^{-t} - \frac{1}{2} e^t}$$

(b)  $x'' + x' = 4t \sin t$

$$x_h(t) = c_1 + c_2 e^{-t}$$

injection method  
: injection method

$$W = \begin{vmatrix} 1 & e^{-t} \\ 0 & -e^{-t} \end{vmatrix} = \underline{\underline{-e^{-t}}}$$

$$u_1' = \frac{-e^{-t} \cdot 4t \sin t}{-e^{-t}} = 4t \sin t$$

:(injection) E injection method

$$u_1 = 4 \int t \sin t dt = \boxed{\begin{matrix} u = t & v = -\cos t \\ u' = 1 & v' = \sin t \end{matrix}} = 4 [ -t \cos t + \int \cos t dt ]$$

$$\boxed{u_1 = -4t \cos t + 4 \sin t}$$

$$u_2' = \frac{1 \cdot 4t \sin t}{-e^{-t}} = -4e^t \cdot t \cdot \sin t$$

$$u_2 = -4 \int e^t \cdot t \cdot \sin t dt = -4 [ \frac{1}{2} (-t e^t \cos t + e^t \cos t + t e^t \sin t) ]$$

injection method

$$\boxed{u_2 = 2t e^t \cos t - 2e^t \cos t - 2t e^t \sin t}$$

$$x(t) = c_1 + c_2 e^{-t} - 4t \cos t + 4 \sin t + 2t \cos t - 2 \cos t - 2t \sin t$$

ihnon p8

$$\boxed{x(t) = c_1 + c_2 e^{-t} - 2t \cos t - 2t \sin t + 4 \sin t - 2 \cos t}$$

$$1. (3) \quad x'' - 2x' + x = (t-3)e^t$$

$$x_h(t) = c_1 e^t + c_2 t e^t$$

$$W(x_1, x_2) = \begin{vmatrix} e^t & t e^t \\ e^t & e^t + t e^t \end{vmatrix} = e^{2t} - t e^{2t} + t e^{2t} = e^{2t}$$

$$u_1' = -\frac{t e^t \cdot (t-3) e^t}{e^{2t}} = -t^2 + 3t$$

$$u_1 = \int (-t^2 + 3t) dt = -\int t^2 dt + 3 \int t dt$$

$$u_1 = -\frac{t^3}{3} + \frac{3t^2}{2}$$

$$u_2' = \frac{e^t \cdot (t-3) e^t}{e^{2t}} = t-3$$

$$u_2 = \int (t-3) dt = \int t dt - 3 \int dt \Rightarrow u_2 = \frac{t^2}{2} - 3t$$

$$x(t) = c_1 e^t + c_2 t e^t - \frac{t^3}{3} e^t + \frac{3t^2}{2} e^t + \frac{t^3}{2} e^t - 3t^2 e^t$$

$$x(t) = c_1 e^t + c_2 t e^t + \frac{1}{6} t^3 e^t - \frac{3}{2} t^2 e^t$$

הצגת הפתרון הכללי

הצגת הפתרון הפרטי

הצגת הפתרון הכללי

הצגת הפתרון הפרטי

$$2. (k) \quad y'' - 2y' + y = \frac{e^x}{x}$$

המשוואה הליניאר הומוגנית (הומוגנית)

$$r^2 - 2r + 1 = 0$$

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

$$r_{1,2} = 1$$

$$y(x) = c_1 e^x + c_2 x \cdot e^x$$

המשוואה הומוגנית (הומוגנית)

$$W = \begin{vmatrix} e^x & x e^x \\ e^x & e^x + x e^x \end{vmatrix} = e^{2x} + e^{2x} x - x e^{2x} = \underline{e^{2x}}$$

המשוואה הומוגנית (הומוגנית)

$$v_1' = - \frac{x e^x \cdot \frac{e^x}{x}}{e^{2x}} = -1$$

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$$V_1 = \int -1 dx = -x$$

$$v_2' = \frac{e^x \cdot \frac{e^x}{x}}{e^{2x}} = \frac{1}{x}$$

$$V_2 = \int \frac{1}{x} = \ln|x|$$

$$y(x) = c_1 e^x + c_2 x e^x - x e^x + \ln|x| \cdot x e^x$$

המשוואה הומוגנית (הומוגנית)

$$2. (a) \quad y'' + 4y = 2 \tan x$$

$$r^2 + 4 = 0$$

$$r^2 = -4$$

$$r = \pm 2i$$

הצורה הכללית של הפתרון הומוג'ני היא  $y_h = C_1 \cos 2x + C_2 \sin 2x$

הצורה הכללית של הפתרון הומוג'ני היא  $y_h = C_1 \cos 2x + C_2 \sin 2x$

$$y(x) = C_1 e^{0x} \cdot \cos 2x + C_2 e^{0x} \cdot \sin 2x = C_1 \cos 2x + C_2 \sin 2x$$

$$W = \begin{vmatrix} \cos 2x & \sin 2x \\ -2 \sin 2x & 2 \cos 2x \end{vmatrix} = 2 \cos^2 2x + 2 \sin^2 2x = 2$$

(לפי) היותו של  $W$

$$V_1' = -\frac{\sin 2x \cdot 2 \tan x}{2} = -\frac{\sin 2x \cdot \sin x}{\cos x} = -\frac{2 \sin x \cdot \cos x \cdot \sin x}{\cos x}$$

לבד

$$= -2 \sin^2 x \Rightarrow V_1 = -2 \int (\sin x)^2 dx = -2 \int (1 - \cos^2 x) dx$$

$$= \int (2 \cos^2 x - 1 - 1) dx = \int (\cos 2x - 1) dx$$

$$= \int \cos 2x dx - \int dx = \frac{\sin 2x}{2} - x$$

$$V_1 = \frac{\sin 2x - 2x}{2}$$

$$V_2' = \frac{\cos 2x \cdot 2 \tan x}{2} = \frac{\cos 2x \cdot \sin x}{\cos x} = \frac{2 \cos^2 x \sin x}{\cos x} - \frac{\sin x}{\cos x}$$

$$= 2 \cos x \sin x - \frac{\sin x}{\cos x} = \sin 2x + \frac{-\sin x}{\cos x}$$

$$V_2 = \int \sin 2x dx + \int \frac{-\sin x}{\cos x} dx = -\frac{1}{2} \cos 2x + \ln |\cos x|$$

$$V_2 = \ln |\cos x| - \frac{1}{2} \cos 2x$$

$$y(x) = C_1 \cos 2x + C_2 \sin 2x + \frac{1}{2} \cos 2x \sin 2x - x \cos 2x + \sin 2x \cdot \ln |\cos x| - \frac{1}{2} \sin 2x \cos 2x$$

הצורה הכללית

$$y(x) = C_1 \cos 2x + C_2 \sin 2x - x \cos 2x + \ln |\cos x| \sin 2x$$

$$2. (b) \quad y'' - y = e^{-x} \cdot \sin(e^{-x}) + \cos(e^{-x})$$

(א) של מהותה הנכונה המושגת

$$r^2 - 1 = 0$$

$$(r+1)(r-1) = 0$$

$$r_1 = 1 \quad r_2 = -1$$

לכן, נניח הנכונה:

$$y_h(x) = c_1 e^x + c_2 e^{-x}$$

(א) של מהותה הנכונה:

$$W = \begin{vmatrix} e^x & e^{-x} \\ e^x & -e^{-x} \end{vmatrix} = -e^0 - e^0 = \underline{\underline{-2}}$$

$$V_1' = \frac{-e^x \cdot (e^{-x} \cdot \sin(e^{-x}) + \cos(e^{-x}))}{-2} = \frac{1}{2} (e^{-2x} \sin(e^{-x}) + e^x \cos(e^{-x}))$$

$$V_1 = \frac{1}{2} \left( \int e^{-2x} \sin(e^{-x}) dx + \int e^x \cos(e^{-x}) dx \right) = \begin{matrix} z = e^{-x} \\ dz = -e^{-x} dx \\ (dx = -\frac{dz}{e^{-x}}) \end{matrix} =$$

$$= \frac{1}{2} \left( -\int z \sin(z) dz - \int \cos(z) dz \right) \ominus$$

$$\int z \sin(z) dz = \begin{matrix} v=z & u=-\cos(z) \\ v'=1 & u'=\sin(z) \end{matrix} = -z \cos(z) + \int \cos(z) dz = -z \cos(z) + \sin(z)$$

$$\ominus \frac{1}{2} (z \cos(z) - \sin(z) - \sin(z)) \Rightarrow V_1 = \frac{1}{2} (e^{-x} \cos(e^{-x}) - 2 \sin(e^{-x}))$$

$$V_2' = \frac{e^x \cdot (e^{-x} \sin(e^{-x}) + \cos(e^{-x}))}{-2} = -\frac{1}{2} (\sin(e^{-x}) + e^x \cos(e^{-x}))$$

$$V_2 = -\frac{1}{2} \left[ \int \sin(e^{-x}) dx + \int e^x \cos(e^{-x}) dx \right] = \begin{matrix} z = e^{-x} \\ dz = -e^{-x} dx \\ (dx = -\frac{1}{z} dz) \end{matrix} =$$

$$= -\frac{1}{2} \left[ -\int \sin(z) \cdot \frac{1}{z} dz - \int \frac{1}{z^2} \cos(z) dz \right] \ominus$$

$$\int \frac{1}{z^2} \cos(z) dz = \begin{matrix} u = -\frac{1}{z} & v = \cos(z) \\ u' = \frac{1}{z^2} & v' = -\sin(z) \end{matrix} = -\frac{\cos(z)}{z} - \int \frac{1}{z} \sin(z) dz$$

$$\ominus -\frac{1}{2} \left[ -\int \sin(z) \cdot \frac{1}{z} dz + \frac{\cos(z)}{z} + \int \frac{1}{z} \sin(z) dz \right] = -\frac{1}{2} \frac{\cos(z)}{z}$$

$$V_2 = -\frac{1}{2} \cdot \cos(e^{-x}) \cdot e^x$$

$$y_p(x) = \frac{1}{2} [\cos(e^{-x}) - 2 \sin(e^{-x}) \cdot e^x - \cos(e^{-x})] = -\sin(e^{-x}) \cdot e^x$$

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

$$2. (3) \quad y'' + 3y' + 2y = \frac{1}{e^{x+1}}$$

הצורה הכללית:

$$r^2 + 3r + 2 = 0$$

$$r_{1,2} = \frac{-3 \pm \sqrt{9 - 4 \cdot 2}}{2} = \frac{-3 \pm 1}{2} \begin{cases} r_1 = -1 \\ r_2 = -2 \end{cases}$$

$$y(x) = c_1 e^{-x} + c_2 e^{-2x}$$

הצורה הכללית:

$$W = \begin{vmatrix} e^{-x} & e^{-2x} \\ -e^{-x} & -2e^{-2x} \end{vmatrix} = -2e^{-3x} + e^{-3x} = -e^{-3x}$$

הצורה הכללית:

$$V_1' = \frac{-e^{-2x} \cdot \frac{1}{e^{x+1}}}{-e^{-3x}} = \frac{e^{-x}}{e^{x+1}} \Rightarrow V_1 = \ln|e^x + 1|$$

$$V_2' = \frac{e^{-x} \cdot \frac{1}{e^{x+1}}}{-e^{-3x}} = -e^{2x} \cdot \frac{1}{e^{x+1}} = -\frac{e^x \cdot e^x}{e^{x+1}}$$

$$V_2 = \int \frac{e^{2x}}{e^{x+1}} dx = \int \frac{z-1}{z} dz = \int 1 dz + \int \frac{1}{z} dz$$

$$= -z + \ln|z| \Rightarrow V_2 = -e^x - 1 + \ln|e^x + 1|$$

$$\Rightarrow V_2 = \ln|e^x + 1| - e^x \quad \left( \begin{smallmatrix} \text{הקנסות} \\ \text{הצורה הכללית} \end{smallmatrix} \right)$$

הצורה הכללית:

$$y(x) = c_1 e^{-x} + c_2 e^{-2x} + e^{-x} \ln|e^x + 1| + e^{-2x} \ln|e^x + 1| - e^{-x}$$

$$y(x) = (c_1 + \ln|e^x + 1|) e^{-x} + (c_2 + \ln|e^x + 1|) e^{-2x}$$

2. (a)

$$y'' - 5y' + 4y = 4x^2 e^{2x}$$

$$y^2 - 5r + 4 = 0$$

$$r_{1,2} = \frac{+5 \pm \sqrt{25-16}}{2} = \frac{5 \pm 3}{2} \begin{cases} r_1 = 1 \\ r_2 = 4 \end{cases}$$

$$Y_h(x) = c_1 e^x + c_2 e^{4x}$$

$$W = \begin{vmatrix} e^x & e^{4x} \\ e^x & 4e^{4x} \end{vmatrix} = 4e^{5x} - e^{5x} = \underline{3e^{5x}}$$

$$V_1' = -\frac{e^{4x} \cdot 4x^2 \cdot e^{2x}}{3e^{5x}} = -\frac{4}{3} x^2 e^x$$

$$V_1 = -\frac{4}{3} \int x^2 e^x dx = \begin{matrix} v=x^2 & u=e^x \\ v'=2x & u'=e^x \end{matrix} = -\frac{4}{3} (x^2 e^x - 2 \int x e^x dx)$$

$$= \begin{matrix} v=x & u=e^x \\ v'=1 & u'=e^x \end{matrix} = -\frac{4}{3} (x^2 e^x - 2e^x \cdot x + 2 \int e^x dx)$$

$$V_1 = -\frac{4}{3} (x^2 e^x - 2x e^x + 2e^x) \Rightarrow V_1 = \underline{-\frac{4}{3} (x^2 - 2x + 2) e^x}$$

$$V_2' = \frac{e^x \cdot 4x^2 e^{2x}}{3e^{5x}} = \frac{4}{3} x^2 \cdot e^{-2x}$$

$$V_2 = \frac{4}{3} \int x^2 e^{-2x} dx = \begin{matrix} v=x^2 & u=\frac{1}{2} e^{-2x} \\ v'=2x & u'=-e^{-2x} \end{matrix} = \frac{4}{3} \left( -\frac{1}{2} x^2 \cdot e^{-2x} + \int x \cdot e^{-2x} dx \right)$$

$$= \begin{matrix} v=x & u=-\frac{1}{2} e^{-2x} \\ v'=1 & u'=e^{-2x} \end{matrix} = \frac{4}{3} \left( -\frac{1}{2} x^2 e^{-2x} - \frac{1}{2} x e^{-2x} + \frac{1}{2} (-\frac{1}{2} e^{-2x}) \right)$$

$$V_2 = -\frac{2}{3} \left( x^2 e^{-2x} + x e^{-2x} + \frac{1}{2} e^{-2x} \right) = -\frac{2}{3} \left( x^2 + x + \frac{1}{2} \right) e^{-2x}$$

$$Y_p(x) = -\frac{4}{3} (x^2 - 2x + 2) e^x \cdot e^x - \frac{2}{3} \left( x^2 + x + \frac{1}{2} \right) e^{-2x} \cdot e^{4x}$$

$$= -\frac{4}{3} (x^2 - 2x + 2) e^{2x} - \frac{1}{3} (2x^2 + 2x + 1) e^{2x}$$

$$= -\frac{1}{3} e^{2x} (4x^2 - 8x + 8 + 2x^2 + 2x + 1)$$

$$Y_p(x) = \underline{-e^{2x} (2x^2 - 2x + 3)}$$

$$Y(x) = c_1 e^x + c_2 e^{4x} - (2x^2 - 2x + 3) e^{2x}$$

$$3. (b) \quad y' + 3y = \cos x$$

הצורה הכללית היא

$$u(x) = e^{\int 3 dx} = e^{3x}$$

$$y' e^{3x} + 3 e^{3x} y = \cos x \cdot e^{3x}$$

$$\int (y \cdot e^{3x})' = \int e^{3x} \cos x dx$$

$$\int e^{3x} \cos x dx = \begin{matrix} u = e^{3x} & v = \sin x \\ u' = 3e^{3x} & v' = \cos x \end{matrix} = e^{3x} \sin x - 3 \int e^{3x} \sin x dx =$$

$$= \begin{matrix} u = e^{3x} & v = -\cos x \\ u' = 3e^{3x} & v' = \sin x \end{matrix} = e^{3x} \sin x + 3e^{3x} \cos x - 9 \int e^{3x} \cos x dx$$

$$\Rightarrow \int e^{3x} \cos x dx = \frac{1}{10} (e^{3x} \sin x - 3e^{3x} \cos x)$$

$\Rightarrow$

$$y \cdot e^{3x} = -\frac{1}{10} e^{3x} (\sin x - 3 \cos x) + C$$

$$y = -\frac{1}{10} (\sin x - 3 \cos x) + C \cdot e^{-3x}$$

$$\boxed{y = \frac{1}{10} (\sin x + 3 \cos x)}$$

הצורה הכללית היא  $C=0$  והוא

הצורה הכללית היא  $y = \frac{1}{10} (\sin x + 3 \cos x)$  והוא

$$(a) \quad y' + (\cos x)y = \sin 2x$$

הצורה הכללית היא

$$u(x) = e^{\int \cos x dx} = e^{\sin x}$$

$$\int (y \cdot e^{\sin x})' = \int e^{\sin x} \sin x \cdot \cos x dx$$

$$\int e^{\sin x} \sin x \cdot \cos x dx = \begin{matrix} z = \sin x \\ dz = \cos x dx \end{matrix} = \int e^z \cdot z dz = \begin{matrix} u = z & v = e^z \\ u' = 1 & v' = e^z \end{matrix} = z \cdot e^z - \int e^z dz = z \cdot e^z - e^z = (\sin x - 1) \cdot e^{\sin x}$$

$$\Rightarrow y \cdot e^{\sin x} = 2(\sin x - 1) e^{\sin x} + C$$

$$y = 2 \sin x - 2 + C \cdot e^{-\sin x}$$

$$\boxed{y = 2 \sin x - 2}$$

הצורה הכללית היא  $C=0$  והוא

הצורה הכללית היא  $y = 2 \sin x - 2$  והוא