Sisteme de ecuatii difererentiale de ordinul intai liniare cu coeficienti constanti

1. Determinati solutia generala pentru urmatoarele sisteme de ecuatii diferentiale:

   (a) $\begin{cases} \frac{dy}{dx} = 2y + z \\ \frac{dz}{dx} = y + 2z \end{cases}$

   (b) $\begin{cases} \frac{dy}{dx} = 4y - 2z \\ \frac{dz}{dx} = 2y \end{cases}$

   (c) $\begin{cases} \frac{dy}{dx} = -y - 4z \\ \frac{dz}{dx} = 2y + 3z \end{cases}$

   (d) $\begin{cases} \frac{dy_1}{dx} = -2y_1 - y_2 + y_3 \\ \frac{dy_2}{dx} = 5y_1 - y_2 + 4y_3 \\ \frac{dy_3}{dx} = 5y_1 + y_2 + 2y_3 \end{cases}$

   (e) $\begin{cases} \frac{dy_1}{dx} = y_1 - y_3 \\ \frac{dy_2}{dx} = y_1 \\ \frac{dy_3}{dx} = y_1 - y_2 \end{cases}$

2. Determinati solutia generala pentru urmatoarele sisteme de ecuatii diferentiale:

   (a) $\begin{cases} \frac{dy}{dx} = y - z \\ \frac{dz}{dx} = y + z + e^x \end{cases}$

   (b) $\begin{cases} \frac{dy}{dx} = 4y + 6z \\ \frac{dz}{dx} = 2y + 3z + x \end{cases}$

   (c) $\begin{cases} \frac{dy}{dx} = 2y - z + (x+1)\, e^{3x} \\ \frac{dz}{dx} = y - 4z + 2xe^{3x} \end{cases}$

   (d) $\begin{cases} \frac{dx}{dt} = 4x + y - 36t \\ \frac{dy}{dt} = -2x + y - 2e^t \end{cases}$

   (e) $\begin{cases} \frac{dx}{dt} = 5x - 3y + te^{2t} \\ \frac{dy}{dt} = 3x - y + e^{3t} \end{cases}$

   (f) $\begin{cases} \frac{dx}{dt} = -y + e^t \\ \frac{dy}{dt} = x + e^{-t} \end{cases}$

   (g) $\begin{cases} \frac{dx}{dt} = -x - 2y + \cos t + \sin t + e^{-t} \\ \frac{dy}{dt} = 2x - y - \cos t + \sin t \end{cases}$

   (h) $\begin{cases} \frac{dx}{dt} = 2x + y + e^t \\ \frac{dy}{dt} = x + 2y + z + t \\ \frac{dz}{dt} = -x - y + z \end{cases}$

3. Rezolvati urmatoarele probleme Cauchy:

(a) $\left\{ \begin{array}{rcl} \frac{dx}{dt} & = & x+3y \\ \frac{dy}{dt} & = & -x+5y-2e^t \end{array} \right.$, $\left\{ \begin{array}{rcl} x(0) & = & 3 \\ y(0) & = & 1 \end{array} \right.$

(b) $\left\{ \begin{array}{rcl} \frac{dx}{dt} & = & y+t \\ \frac{dy}{dt} & = & x+e^t \end{array} \right.$, $\left\{ \begin{array}{rcl} x(0) & = & 1 \\ y(0) & = & 0 \end{array} \right.$

(c) $\left\{ \begin{array}{rcl} \frac{dx}{dt} & = & -y+1 \\ \frac{dy}{dt} & = & x+e^t \end{array} \right.$, $\left\{ \begin{array}{rcl} x(0) & = & 0 \\ y(0) & = & 1 \end{array} \right.$

(d) $\left\{ \begin{array}{rcl} \frac{dx}{dt} & = & y \\ \frac{dy}{dt} & = & z \\ \frac{dz}{dt} & = & x \end{array} \right.$, $\left\{ \begin{array}{rcl} x(0) & = & 1 \\ y(0) & = & 1 \\ z(0) & = & 1 \end{array} \right.$

(e) $\left\{ \begin{array}{rcl} \frac{dy}{dx} & = & \frac{z}{x} \\ \frac{dz}{dx} & = & \frac{y}{x} \end{array} \right.$, $\left\{ \begin{array}{rcl} y(1) & = & 0 \\ z(1) & = & -1 \end{array} \right.$