Homogenní soustavy lineárních diferenciálních rovnic

Řešte soustavy $y' = \mathbb{A}y$.

$$\mathbf{1}.\ \mathbb{A} = \begin{pmatrix} 0 & 1 & 0 \\ -4 & 4 & 0 \\ -2 & 1 & 2 \end{pmatrix}, \qquad \mathbf{2}.\ \mathbb{A} = \begin{pmatrix} 2 & 6 & -15 \\ 1 & 1 & -5 \\ 1 & 2 & -6 \end{pmatrix}, \qquad \mathbf{3}.\ \mathbb{A} = \begin{pmatrix} 3 & 0 & 0 \\ 2 & 2 & -1 \\ -1 & 1 & 4 \end{pmatrix},$$

$$\mathbf{4}.\ \mathbb{A} = \begin{pmatrix} 1 & -1 & 1 \\ -1 & 2 & 2 \\ -2 & 1 & 3 \end{pmatrix}, \qquad \mathbf{5}.\ \mathbb{A} = \begin{pmatrix} 1 & -3 & 0 & 3 \\ -2 & -6 & 0 & 13 \\ 0 & -3 & 1 & 3 \\ -1 & -4 & 0 & 8 \end{pmatrix} \qquad \mathbf{6}.\ \mathbb{A} = \begin{pmatrix} 3 & -1 & 0 & 0 \\ 1 & 1 & 0 & 0 \\ 3 & 0 & 5 & -3 \\ 4 & -1 & 3 & -1 \end{pmatrix},$$

$$\mathbf{7}.\ \mathbb{A} = \begin{pmatrix} -1 & 2 & -1 & 2 \\ -1 & 2 & -1 & 1 \\ 0 & 2 & -1 & 1 \\ -2 & 2 & 0 & 2 \end{pmatrix}$$

Výsledky

1. $y(x) = (e^{2x}(bx + c), e^{2x}(2bx + b + 2c), e^{2x}(bx + a + c)),\ a, b, c \in \mathbb{R}.$

2. $y(x) = (e^{-x}(-25a + 6c + 6bx), e^{-x}(15a + 2bx + b + 2c), e^{-x}(a + 2bx + 2c)),\ a, b, c \in \mathbb{R}.$

3. $y(x) = (-2a \cdot e^{3x}, e^{3x} \cdot (ax^2 + bx + c), e^{3x} \cdot (-ax^2 - (2a + b)x - 4a - b - c),\ a, b, c \in \mathbb{R}.$

4. $y(x) = ((a + 3b)e^x \sin x + (3a - b)e^x \cos x, (2a + b)e^x \sin x + (a - 2b)e^x \cos x + ce^{4x}, (2b - a)e^x \sin x + (2a + b)e^x \cos x + ce^{4x}),\ a, b, c \in \mathbb{R}.$

5. $y(x) = (e^x(bx^2 + cx + d), e^x(\frac{1}{3}bx^2 - \frac{1}{3}(4b - c)x - \frac{2}{9}b - \frac{2}{3}c + \frac{1}{3}d), e^x(a + bx^2 + cx + d), e^x(\frac{1}{3}bx^2 - \frac{1}{3}(2b - c)x - \frac{2}{9}b - \frac{1}{3}c + \frac{1}{3}d),\ a, b, c, d \in \mathbb{R}.$

6. $y(x) = (e^{2x}(cx + d), e^{2x}(cx - c + d), e^{2x}(ax + b), e^{2x}((a + c)x - \frac{1}{3}a + b + d),\ a, b, c, d \in \mathbb{R}.$

7. $y(x) = (e^x(a \cos x + b \sin x) + c \cos x + d \sin x, \frac{1}{2}e^x((a + b) \cos x + (b - a) \sin x) + c \cos x + d \sin x, e^x(a \cos x + b \sin x) + (c - d) \cos x + (c + d) \sin x, e^x(a \cos x + b \sin x)),\ a, b, c, d \in \mathbb{R}.$