Řešte soustavy $\mathbf{x}' = A\mathbf{x} + b(t)$, kde

1. $\mathbb{A} = \begin{pmatrix} 0 & 1 & 0 \\ -4 & 4 & 0 \\ -2 & 1 & 2 \end{pmatrix}$, $b(t) = \begin{pmatrix} 1 \\ t \\ t^2 \end{pmatrix}$

2. $\mathbb{A} = \begin{pmatrix} 2 & 6 & -15 \\ 1 & 1 & -5 \\ 1 & 2 & -6 \end{pmatrix}$, $b(t) = \begin{pmatrix} e^t \\ e^t \\ e^t \end{pmatrix}$

3. $\mathbb{A} = \begin{pmatrix} 3 & 0 & 0 \\ 2 & 2 & -1 \\ -1 & 1 & 4 \end{pmatrix}$, $b(t) = \begin{pmatrix} \sin t \\ 0 \\ 0 \end{pmatrix}$

4. $\mathbb{A} = \begin{pmatrix} 7 & -12 & 6 \\ 10 & -19 & 10 \\ 12 & -24 & 13 \end{pmatrix}$

5. $\mathbb{A} = \begin{pmatrix} 1 & -1 & 1 \\ -1 & 2 & 2 \\ -2 & 1 & 3 \end{pmatrix}$

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

7. $\mathbb{A} = \begin{pmatrix} 3 & -1 & 1 & -7 \\ 9 & -3 & -7 & -1 \\ 0 & 0 & 4 & -8 \\ 0 & 0 & 2 & -4 \end{pmatrix}$

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

Výsledky. Uvedeny pro $\mathbf{x} = (x, y, z)^T$, případně $\mathbf{x} = (x, y, z, v)^T$ a s koeficienty $a, b, c, d \in \mathbf{R}$. **1.** $x = \frac{t-3}{4} + e^{2t}(bt + c)$, $y = -\frac{3}{4} + e^{2t}(2bt + b + 2c)$, $z = -\frac{2t^2+t+2}{4} + e^{2t}(bt + a + c)$ **2.** $x = e^{-t}(-1+6c+6bt)$, $y = e^{-t}(15a+2bt+b+2c)$, $z = e^{-t}(a+2bt+2c)$ **3.** $x = -\frac{1}{10}\cos t - \frac{3}{10}\sin t - 2a\cdot e^{3t}$, $y = \frac{73}{500}\cos t + \frac{89}{500}\sin t + e^{3t}(at^2 + bt + c)$, $z = -\frac{43}{500}\cos t - \frac{49}{500}\sin t + e^{3t}(-at^2 - (2a+b)t - 4a - b - c)$ **4.** $x = 6be^{-t} + 6ce^t$, $y = 10ae^{-t} + (3a+9c)e^t$, $z = 3be^{-t} + (6a+3c)e^t$ **5.** $x = (a+3b)e^t\sin t + (3a-b)e^t\cos t$, $y = (2a+b)e^t\sin t + (a-2b)e^t\cos t + ce^{4t}$, $z = (2b-a)e^t\sin t + (2a+b)e^t\cos t + ce^{4t}$ **6.** $x = e^t(bt^2+ct+d)$, $y = e^t(\frac{1}{3}bt^2 - \frac{1}{3}(4b-c)t - \frac{2}{9}b - \frac{2}{3}c + \frac{1}{3}d$, $z = e^t(a+bt^2+ct+d)$, $v = e^t(\frac{1}{3}bt^2 - \frac{1}{3}(2b-c)t - \frac{2}{9}b - \frac{1}{3}c + \frac{1}{3}d$ **7.** $x = ct + d$, $y = (3c - \frac{5}{2}a)t + \frac{7}{8}a - \frac{5}{2}b - c + 3d$, $z = at + b$, $v = \frac{1}{2}at - \frac{1}{8}a + \frac{1}{2}b$ **8.** $x = e^t(a\cos t + b\sin t) + c\cos t + d\sin t$, $y = \frac{1}{2}e^t((a+b)\cos t + (b-a)\sin t + c\cos t + d\sin t$, $z = e^t(a\cos t + b\sin t) + (c-d)\cos t + (c+d)\sin t$, $v = e^t(a\cos t + b\sin t)$