

1. Riešte dané homogénne systémy diferenciálnych rovníc.

a)

$$y_1' = 7y_1 + 6y_2$$

$$y_2' = 2y_1 + 6y_2$$

b)

$$y_1' = y_1 + y_2$$

$$y_2' = 8y_1 - y_2$$

c)

$$y_1' = -3y_1 - y_2$$

$$y_2' = y_1 - y_2$$

$$y_1(0) = y_2(0) = 1$$

d)

$$y_1' = 4y_1 - 9y_2 + 5y_3$$

$$y_2' = y_1 - 10y_2 + 7y_3$$

$$y_3' = y_1 - 17y_2 + 12y_3$$

e)

$$y_1' = y_1 - y_2 + y_3$$

$$y_2' = y_1 + y_2 - y_3$$

$$y_3' = -y_2 + y_3$$

f)

$$y_1' = y_1 - y_2$$

$$y_2' = y_1 - y_3$$

$$y_3' = y_1$$

g)

$$y_1' = y_1 + y_2 + y_3$$

$$y_2' = y_1 - y_2 + y_3$$

$$y_3' = y_1 + y_2 - y_3$$

$$y_1(0) = y_2(0) = y_3(0) = 1$$

**Výsledky:**

**1a.**  $y_1 = 2c_1e^{10x} + 3c_2e^{3x}$ ,  $y_2 = c_1e^{10x} - 2c_2e^{3x}$

**1b.**  $y_1 = c_1e^{3x} + c_2e^{-3x}$ ,  $y_2 = 2c_1e^{3x} - 4c_2e^{-3x}$

**1c.**  $y_1 = (1 - 2x)e^{-2x}$ ,  $y_2 = (1 + 2x)e^{-2x}$

**1d.**  $y_1 = c_1e^x + c_2e^{2x} - c_3e^{3x}$ ,  $y_2 = 2c_1e^x + 3c_2e^{2x} + c_3e^{3x}$ ,  $y_3 = 3c_1e^x + 5c_2e^{2x} + 2c_3e^{3x}$

**1e.**  $y_1 = c_1(\cos \frac{\sqrt{3}}{2}x - \sqrt{3} \sin \frac{\sqrt{3}}{2}x)e^{\frac{x}{2}} + c_2(\sqrt{3} \cos \frac{\sqrt{3}}{2}x + 3 \sin \frac{\sqrt{3}}{2}x)e^{\frac{x}{2}} + c_3$ ,  
 $y_2 = c_1(\cos \frac{\sqrt{3}}{2}x + \sqrt{3} \sin \frac{\sqrt{3}}{2}x)e^{\frac{x}{2}} + c_2(-\sqrt{3} \cos \frac{\sqrt{3}}{2}x + \sin \frac{\sqrt{3}}{2}x)e^{\frac{x}{2}} + c_3$ ,  $y_3 = 2c_1 \cos \frac{\sqrt{3}}{2}xe^{\frac{x}{2}} + 2c_2 \sin \frac{\sqrt{3}}{2}xe^{\frac{x}{2}} + c_3$

**1f.**  $y_1 = -c_1 \sin x + c_2 \cos x + c_3$ ,  $y_2 = c_1(\cos x - \sin x) + c_2(\sin x + \cos x)$ ,  
 $y_3 = c_1 \cos x + c_3$

**1g.**  $y_1 = \frac{4}{3}e^{2x} - \frac{1}{3}e^{-x}$ ,  $y_2 = \frac{2}{3}e^{2x} + \frac{1}{3}e^{-x}$ ,  $y_3 = \frac{2}{3}e^{2x} + \frac{1}{3}e^{-x}$