

§1. Polynomy, kořeny polynomů

***68.** Objem 1 cm³ rtuti při teplotě t °C ($t \geq 0$ °C) se dá určit podle vztahu

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$V_t = 3 \cdot 10^{-8} \cdot t^2 + 2 \cdot 10^{-4} \cdot t + 1$. Jak vysoko musí vystoupit teplota, aby se objem rtuti zvětšil na 1,001 cm³?

$$3 \cdot 10^{-8} t^2 + 2 \cdot 10^{-4} t - 0.001 = 0$$

$$3t^2 + 2000t - 100000 = 0$$

$$t = \frac{-1000 \pm 100\sqrt{130}}{3} \text{ Vyhoví pouze } t = \frac{-1000 + 100\sqrt{130}}{3} = 46.7^\circ$$

***353. a)** $4x + 3y - 2z = 40,$
 $6x - 5y + 3z = 50,$
 $3x + 2y + 5z = 220;$

b) $0,2x + 0,3y + 0,4z = 29,$
 $0,3x + 0,4y + 0,5z = 38,$
 $0,4x + 0,5y + 0,7z = 51.$

$$\begin{aligned} \bar{A} &= \left(\begin{array}{ccc|c} 4 & 3 & -2 & 40 \\ 6 & -5 & 3 & 50 \\ 3 & 2 & 5 & 220 \end{array} \right) \sim \left(\begin{array}{ccc|c} 3 & 2 & 5 & 220 \\ 4 & 3 & -2 & 40 \\ 6 & -5 & 3 & 50 \end{array} \right) \sim \left(\begin{array}{ccc|c} 3 & 2 & 5 & 220 \\ 0 & 1 & -26 & -760 \\ 0 & -9 & -7 & -390 \end{array} \right) \sim \\ &\left(\begin{array}{ccc|c} 3 & 2 & 5 & 220 \\ 0 & 1 & -26 & -760 \\ 0 & 9 & 7 & 390 \end{array} \right) \sim \left(\begin{array}{ccc|c} 3 & 2 & 5 & 220 \\ 0 & 1 & -26 & -760 \\ 0 & 0 & 241 & 7230 \end{array} \right) \sim \left(\begin{array}{ccc|c} 3 & 2 & 5 & 220 \\ 0 & 1 & -26 & -760 \\ 0 & 0 & 1 & 30 \end{array} \right) \sim \\ &\left(\begin{array}{ccc|c} 3 & 0 & 57 & 1740 \\ 0 & 1 & -26 & -760 \\ 0 & 0 & 1 & 30 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & 0 & 19 & 580 \\ 0 & 1 & -26 & -760 \\ 0 & 0 & 1 & 30 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & 0 & 0 & 10 \\ 0 & 1 & 0 & 20 \\ 0 & 0 & 1 & 30 \end{array} \right) \end{aligned}$$

$$P = \{[10; 20; 30]\}$$

$$\begin{aligned} \bar{A} &= \left(\begin{array}{ccc|c} 2 & 3 & 4 & 290 \\ 3 & 4 & 5 & 380 \\ 4 & 5 & 7 & 510 \end{array} \right) \sim \left(\begin{array}{ccc|c} 2 & 3 & 4 & 290 \\ 0 & -1 & -2 & -110 \\ 0 & -1 & -1 & -70 \end{array} \right) \sim \left(\begin{array}{ccc|c} 2 & 3 & 4 & 290 \\ 0 & 1 & 2 & 110 \\ 0 & 1 & 1 & 70 \end{array} \right) \sim \left(\begin{array}{ccc|c} 2 & 3 & 4 & 290 \\ 0 & 1 & 2 & 110 \\ 0 & 0 & -1 & -40 \end{array} \right) \sim \\ &\left(\begin{array}{ccc|c} 2 & 3 & 4 & 290 \\ 0 & 1 & 2 & 110 \\ 0 & 0 & 1 & 40 \end{array} \right) \sim \left(\begin{array}{ccc|c} 2 & 0 & -2 & -40 \\ 0 & 1 & 2 & 110 \\ 0 & 0 & 1 & 40 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & 0 & -1 & -20 \\ 0 & 1 & 2 & 110 \\ 0 & 0 & 1 & 40 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & 0 & 0 & 20 \\ 0 & 1 & 0 & 30 \\ 0 & 0 & 1 & 40 \end{array} \right) \end{aligned}$$

$$P = \{[20; 30; 40]\}$$

*371. Jsou-li x, y, z neznámé a parametr p libovolné číslo, řešte soustavu a proveďte diskusi jejího řešení.

a) $x + y + z = 6,$
 $x + py = 9,$
 $y = z - 1;$

b) $x + y + z = 3,$
 $x + p(y + z) = 5,$
 $y - z = 0;$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 1 & p & 0 & 9 \\ 0 & 0 & 0 & -1 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & p-1 & -1 & 3 \\ 0 & 0 & 0 & -1 \end{array} \right)$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & p-1 & -1 & 3 \\ 0 & 0 & 0 & -1 \end{array} \right) \xrightarrow{R_3 \leftrightarrow R_2} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 6 \\ 0 & 0 & 0 & -1 \\ 0 & p-1 & -1 & 3 \end{array} \right)$$

$n=2: 0 \neq -4$ NR

$$\left(\begin{array}{ccc|c} 2-p & 2-p & 0 & 6(2-p)+4 \\ 2-p & 0 & 0 & 9(2-p)-p(-4) \\ 2-p & -4 & 0 & -4 \end{array} \right) \sim \left(\begin{array}{ccc|c} 2-p & 2-p & 0 & 16-6p \\ 2-p & 0 & 0 & 18-5p \\ 2-p & -4 & 0 & -4 \end{array} \right)$$

$$p = \left\{ \left[\frac{16-6p}{2-p}, \frac{-4}{2-p}, \frac{18-5p}{2-p} \right] \right\}$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 1 & p & 0 & 5 \\ 0 & 0 & 0 & 0 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & p-1 & -1 & 2 \\ 0 & 0 & 0 & 0 \end{array} \right) \sim$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & p-1 & -1 & 2 \\ 0 & 0 & 0 & 0 \end{array} \right) \sim \left(\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & p-1 & -1 & 2 \\ 0 & 0 & 0 & 0 \end{array} \right) \sim$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & p-1 & -1 & 2 \\ 0 & 0 & 0 & 0 \end{array} \right) \xrightarrow{R_2 \leftrightarrow R_3} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & 0 & 0 & 0 \\ 0 & p-1 & -1 & 2 \end{array} \right)$$