NÁHRADA ZA VYMAZANÚ TABUĽU (príklady nie sú totožné s tými, čo boli)

Determinanty – pokračovanie

$$\begin{vmatrix} 2 & 3 \\ -4 & 5 \end{vmatrix} = 10-(-12) = \underline{\underline{22}}$$

$$\begin{vmatrix} 2 & 3 & -1 \\ 1 & -2 & 4 \\ 3 & 1 & 5 \end{vmatrix} = (-20-1+36)-(6+8+15) = 15-29 = \underline{\underline{-14}}$$

$$\begin{matrix} 2 & 3 & -1 \\ 1 & -2 & 4 \end{matrix}$$

rozvojom podľa druhého stĺpca

$$\begin{vmatrix} 2 & -1 & 3 & 1 \\ -3 & 4 & -2 & 2 \\ 1 & 3 & 0 & -2 \\ -2 & -1 & -1 & 3 \end{vmatrix} = 3\cdot(-1)^{1+3}\begin{vmatrix} -3 & 4 & 2 \\ 1 & 3 & -2 \\ -2 & -1 & 3 \end{vmatrix} + (-2)\cdot(-1)^{2+3}\begin{vmatrix} 2 & -1 & 1 \\ 1 & 3 & -2 \\ -2 & -1 & 3 \end{vmatrix} +$$

$$+ 0\cdot(-1)^{3+3}\begin{vmatrix} 2 & -1 & 1 \\ -3 & 4 & 2 \\ -2 & -1 & 3 \end{vmatrix} + (-1)\cdot(-1)^{4+3}\begin{vmatrix} 2 & -1 & 1 \\ -3 & 4 & 2 \\ 1 & 3 & -2 \end{vmatrix} = \ldots$$

$$\begin{vmatrix} 2 & -1 & 3 & 1 \\ -3 & 4 & -2 & 2 \\ 1 & 3 & 0 & -2 \\ -2 & -1 & -1 & 3 \end{vmatrix} \begin{matrix} +3R_4 \\ -2R_4 \end{matrix} = \begin{vmatrix} -4 & -4 & 0 & 10 \\ 1 & 6 & 0 & -4 \\ 1 & 3 & 0 & -2 \\ -2 & -1 & -1 & 3 \end{vmatrix} = (-1)(-1)^{4+3}\begin{vmatrix} -4 & -4 & 10 \\ 1 & 6 & -4 \\ 1 & 3 & -2 \end{vmatrix} =$$

$$\begin{matrix} -4 & -4 & 10 \\ 1 & 6 & -4 \end{matrix}$$

$$= (48+30+16)-(60+48+8) = \underline{\underline{-22}}$$

Cramerovo pravidlo

$$\begin{aligned} x_1 + x_2 - x_3 &= 2 \\ 3x_1 + 2x_2 - 2x_3 &= 5 \\ 4x_1 - 3x_2 + 2x_3 &= -1 \end{aligned}$$

$$\begin{array}{c} \begin{array}{cccc} x_1 & x_2 & x_3 & PS \end{array} \\ \left(\begin{array}{ccc|c} 1 & 1 & -1 & 2 \\ 3 & 2 & -2 & 5 \\ 4 & -3 & 2 & -1 \end{array}\right) \end{array}$$

$$D = \begin{vmatrix} 1 & 1 & -1 \\ 3 & 2 & -2 \\ 4 & -3 & 2 \end{vmatrix} = (4+9-8)-(-8+6+6) = 1$$

$$\begin{matrix} 1 & 1 & -1 \\ 3 & 2 & -2 \end{matrix}$$

$$D_1 = \begin{vmatrix} 2 & 1 & -1 \\ 5 & 2 & -2 \\ -1 & -3 & 2 \end{vmatrix} = (8+15+2)-(2+12+10) = 1 \qquad x_1 = \frac{D_1}{D} = \frac{1}{1} = \underline{\underline{1}}$$

$$\begin{matrix} 2 & 1 & -1 \\ 5 & 2 & -2 \end{matrix}$$

$$D_2 = \begin{vmatrix} 1 & 2 & -1 \\ 3 & 5 & -2 \\ 4 & -1 & 2 \end{vmatrix} = (10+3-16)-(-20+2+12) = 3 \qquad x_2 = \frac{D_2}{D} = \frac{3}{1} = \underline{\underline{3}}$$

$$\begin{matrix} 1 & 2 & -1 \\ 3 & 5 & -2 \end{matrix}$$

$$D_3 = \begin{vmatrix} 1 & 1 & 2 \\ 3 & 2 & 5 \\ 4 & -3 & -1 \end{vmatrix} = (-2-18+20)-(16-15-3) = 2 \qquad x_3 = \frac{D_3}{D} = \frac{2}{1} = \underline{\underline{2}}$$

$$\begin{matrix} 1 & 1 & 2 \\ 3 & 2 & 5 \end{matrix}$$

$$(x_1, x_2, x_3)^T = (1, 3, 2)^T$$

$$\begin{aligned} x + 2y + 3z &= -1 \\ 2x + 3y + z &= 0 \\ -3x + 5y + 2z &= 3 \end{aligned}$$

$$\begin{array}{c} \begin{array}{cccc} x & y & z & PS \end{array} \\ \left(\begin{array}{ccc|c} 1 & 2 & 3 & -1 \\ 2 & 3 & 1 & 0 \\ -3 & 5 & 2 & 3 \end{array}\right) \end{array}$$

$$D = \begin{vmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ -3 & 5 & 2 \end{vmatrix} = (6+30-6)-(-27+5+8) = 44$$

$$\begin{matrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{matrix}$$

$$D_1 = \begin{vmatrix} -1 & 2 & 3 \\ 0 & 3 & 1 \\ 3 & 5 & 2 \end{vmatrix} = (-6+6)-(27-5) = -22 \qquad x = \frac{D_1}{D} = \frac{-22}{44} = \underline{\underline{-\frac{1}{2}}}$$

$$\begin{matrix} -1 & 2 & 3 \\ 0 & 3 & 1 \end{matrix}$$

$$D_2 = \begin{vmatrix} 1 & -1 & 3 \\ 2 & 0 & 1 \\ -3 & 3 & 2 \end{vmatrix} = (18+3)-(3-4) = 22 \qquad y = \frac{D_2}{D} = \frac{22}{44} = \underline{\underline{\frac{1}{2}}}$$

$$\begin{matrix} 1 & -1 & 3 \\ 2 & 0 & 1 \end{matrix}$$

$$D_3 = \begin{vmatrix} 1 & 2 & -1 \\ 2 & 3 & 0 \\ -3 & 5 & 3 \end{vmatrix} = (9-10)-(9+12) = -22 \qquad z = \frac{D_3}{D} = \frac{-22}{44} = \underline{\underline{-\frac{1}{2}}}$$

$$\begin{matrix} 1 & 2 & -1 \\ 2 & 3 & 0 \end{matrix}$$

$$(x, y, z)^T = \left(-\frac{1}{2}, \frac{1}{2}, -\frac{1}{2}\right)^T$$

$$\begin{aligned} 3x_2 + 2x_3 &= -6 \\ x_1 + x_2 \qquad &= 3 \\ 2x_1 \qquad - 3x_3 &= 10 \end{aligned}$$

$$\left(\begin{array}{ccc|c} 0 & 3 & 2 & -6 \\ 1 & 1 & 0 & 3 \\ 2 & 0 & -3 & 10 \end{array}\right)$$

$$D = \begin{vmatrix} 0 & 3 & 2 \\ 1 & 1 & 0 \\ 2 & 0 & -3 \end{vmatrix} = -(4-9) = 5$$

$$D_1 = \begin{vmatrix} -6 & 3 & 2 \\ 3 & 1 & 0 \\ 10 & 0 & -3 \end{vmatrix} = (18)-(20-27) = 25 \qquad x_1 = \frac{D_1}{D} = \underline{\underline{5}}$$

$$D_2 = \begin{vmatrix} 0 & -6 & 2 \\ 1 & 3 & 0 \\ 2 & 10 & -3 \end{vmatrix} = (20)-(12+18) = -10 \qquad x_2 = \frac{D_2}{D} = \underline{\underline{-2}}$$

$$D_3 = \begin{vmatrix} 0 & 3 & -6 \\ 1 & 1 & 3 \\ 2 & 0 & 10 \end{vmatrix} = (18)-(-12+30) = 0 \qquad x_3 = \frac{D_3}{D} = \underline{\underline{0}}$$

$$(x_1, x_2, x_3)^T = (5, -2, 0)^T = \begin{pmatrix} 5 \\ -2 \\ 0 \end{pmatrix}$$