

1) Vypočítejte součin matic $\mathbf{A} \cdot \mathbf{B}$ a $\mathbf{B} \cdot \mathbf{A}$ a u příkladu b) i součet $\mathbf{A} + \mathbf{B}$, jsou-li dány matice \mathbf{A} , \mathbf{B} :

a) $\mathbf{A} = (4 \ 2 \ -1 \ 1)$ $\mathbf{B} = \begin{pmatrix} 2 \\ 0 \\ -1 \\ 2 \end{pmatrix}$

b) $\mathbf{A} = \begin{pmatrix} 3 & 4 & 1 \\ 0 & -2 & 3 \\ 2 & 1 & -1 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 1 & -2 & 1 \\ 0 & 3 & 8 \\ 4 & 1 & -2 \end{pmatrix}$

c) $\mathbf{A} = \begin{pmatrix} \cos x & \sin x \\ -\sin x & -\cos x \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} \cos x & -\sin x \\ \sin x & -\cos x \end{pmatrix}$

2) Vypočítejte determinanty matic:

$$\begin{vmatrix} 2 & 4 \\ 4 & 8 \end{vmatrix} =$$

$$\begin{vmatrix} 1 & 0 & -2 \\ 4 & 2 & 1 \\ 2 & 0 & 3 \end{vmatrix} =$$

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

3) Určete matici inverzní \mathbf{A}^{-1} a matici transponovanou \mathbf{A}^T k matici \mathbf{A} a ověřte, že platí $\mathbf{A} \cdot \mathbf{A}^{-1} = \mathbf{E}$ (\mathbf{E} je jednotková matice)

$$\mathbf{A} = \begin{pmatrix} 1 & 0 & 2 \\ 3 & -1 & 1 \\ 0 & 2 & -1 \end{pmatrix}$$

$$\textcircled{1} \text{ a) } A \cdot B = 11$$

$$B \cdot A = \begin{pmatrix} 8 & 4 & -2 & 2 \\ 0 & 0 & 0 & 0 \\ -4 & -2 & 1 & -1 \\ 8 & 4 & -2 & 2 \end{pmatrix}$$

$$\text{b) } A \cdot B = \begin{pmatrix} 7 & 7 & 33 \\ 12 & -3 & -22 \\ -2 & -2 & 12 \end{pmatrix}$$

$$B \cdot A = \begin{pmatrix} 5 & 9 & -6 \\ 16 & 2 & 1 \\ 8 & 12 & 9 \end{pmatrix}$$

$$A + B = \begin{pmatrix} 4 & 2 & 2 \\ 0 & 1 & 11 \\ 6 & 2 & -3 \end{pmatrix}$$

$$\text{c) } A \cdot B = \begin{pmatrix} \cos^2 x + \sin^2 x & -2\sin x \cos x \\ -2\sin x \cos x & 1 \end{pmatrix} = \begin{pmatrix} 1 & -\sin 2x \\ -\sin 2x & 1 \end{pmatrix}$$

$$B \cdot A = \begin{pmatrix} 1 & \sin 2x \\ \sin 2x & 1 \end{pmatrix}$$

$$\textcircled{2} \text{ a) } 0$$

$$\text{b) } 14$$

$$\text{c) } -39$$

$$\textcircled{3} \text{ } A^{-1} = \begin{pmatrix} -\frac{1}{11} & \frac{4}{11} & \frac{2}{11} \\ \frac{5}{11} & -\frac{1}{11} & \frac{5}{11} \\ \frac{6}{11} & -\frac{2}{11} & -\frac{1}{11} \end{pmatrix}$$

$$A^T = \begin{pmatrix} 1 & 3 & 0 \\ 0 & -1 & 2 \\ 2 & 1 & -1 \end{pmatrix}$$