

**RIEŠENIE NIEKTORÝCH VÝPOČTOVÝCH ÚLOH
V PROSTREDÍ MS MATHEMATICS**

ÚLOHA

Vypočítajte v MS Mathematics nasledovné typy úloh (príkladov);

a) $\lim_{x \rightarrow -\infty} \frac{7x^2 + 2}{2x^2 - x - 6}$

b) $\lim_{n \rightarrow \infty} \left(\frac{n^2 + 6}{n^2} \right)^{n^2}$

c) $\int \ln x \, dx$

d) $\int_0^4 x \sqrt{x^2 + 9} \, dx$

e) $\int_{-\infty}^0 e^{3x} \, dx$

f) $\int_{-1}^1 \frac{5}{x} \, dx$

g) $\sum_{n=1}^{\infty} \left(\frac{1}{3} \right)^n$

h) $\sum_{n=1}^{\infty} \frac{1}{n}$

i) $\rho = ?$, $\sum_{n=0}^{\infty} \frac{5^n x^n}{(n+1)^2}$

j) $\mathbf{A} \cdot \mathbf{B} = ?$, $\mathbf{A} = \begin{pmatrix} 177 & 135 & 136 \\ 129 & 84 & 113 \\ 123 & 113 & 76 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 20 \\ 25 \\ 40 \end{pmatrix}$

k) $h(\mathbf{A}) = ?$, $\mathbf{A}^{-1} = ?$, $\mathbf{A} = \begin{pmatrix} 1 & 0 & 2 \\ 2 & 1 & -1 \\ 1 & 1 & -2 \end{pmatrix}$

l) $|\mathbf{A}| = ?$, $\mathbf{A} = \begin{pmatrix} 4 & -1 & -1 \\ -1 & 2 & 0 \\ -1 & 0 & 0 \end{pmatrix}$

m) $x_1, x_2, x_3 = ?$, $1x_1 + 1x_2 + 1x_3 = 5$
 $1x_1 + 2x_2 + 3x_3 = 8$
 $1x_1 + 3x_2 + 5x_3 = 11$

INŠTALÁCIA

<https://www.microsoft.com/en-us/download/details.aspx?id=15702>

RIEŠENIE

(červenou farbou si vyznačené využité ovládacie prvky v danej úlohe (príklade))

a) $\lim_{x \rightarrow \infty} \frac{7x^2 + 2}{2x^2 - x - 6}$

The screenshot shows the Microsoft Mathematics interface. The 'Worksheet' tab is selected. The input field contains the limit expression $\lim_{x \rightarrow \infty} \left(\frac{7x^2 + 2}{2x^2 - x - 6} \right)$. The output field displays the result $\frac{7}{2}$ and its decimal equivalent 3.5. The calculator interface on the left has several buttons circled in red: the limit button (lim), the infinity button (∞), the fraction button (c/d), and the power button (^).

b) $\lim_{n \rightarrow \infty} \left(\frac{n^2 + 6}{n^2} \right)^{n^2}$

The screenshot shows the Microsoft Mathematics interface. The 'Worksheet' tab is selected. The input field contains the limit expression $\lim_{n \rightarrow \infty} \left(\frac{n^2 + 6}{n^2} \right)^{n^2}$. The output field displays the result e^6 and its decimal equivalent 403.428793492735. The calculator interface on the left has several buttons circled in red: the limit button (lim), the infinity button (∞), the power button (^), and the fraction button (c/d).

c) $\int \ln x \, dx$

The screenshot shows the Microsoft Mathematics software interface. On the left is a virtual calculator with various mathematical function buttons. The 'Calculus' section is expanded, and the integral button (∫) is circled in red. The main workspace is titled 'Worksheet' and 'Graphing'. The 'Input' field contains the expression $\int \ln(x) \, dx$. The 'Output' field displays the result $x \ln(x) - x + C$. Below the output, there are links for 'differentiate on x', 'integrate on x', 'plot this expression in 2D', and 'plot this expression in 3D'. At the bottom right, there are 'Clear' and 'Enter' buttons.

d) $\int_0^4 x\sqrt{x^2+9} \, dx$

The screenshot shows the Microsoft Mathematics software interface. On the left is a virtual calculator. The 'Calculus' section is expanded, and the integral button (∫) is circled in red. The 'Standard' section is also expanded, and the square root button (√) is circled in red. The main workspace is titled 'Worksheet' and 'Graphing'. The 'Input' field contains the expression $\int_0^4 x\sqrt{x^2+9} \, dx$. The 'Output' field displays the result $\frac{98}{3}$. The 'Decimal Output' field displays the decimal value 32.6666666666667. At the bottom right, there are 'Clear' and 'Enter' buttons.

e) $\int_{-\infty}^0 e^{3x} dx$

The screenshot shows the Microsoft Mathematics interface. On the left is a virtual calculator with various mathematical functions. Red circles highlight the integral button (\int), the natural exponential base button (e), and the infinity button (∞). The main workspace is divided into 'Worksheet' and 'Graphing' tabs. Under 'Worksheet', the input field contains the integral $\int_{-\infty}^0 e^{3x} dx$. The output field shows the result $\frac{1}{3}$, and the decimal output field shows 0.33333333333333 . Below the output fields is a large empty text area with 'Clear' and 'Enter' buttons.

f) $\int_{-1}^1 \frac{5}{x} dx$

The screenshot shows the Microsoft Mathematics interface. On the left is a virtual calculator. Red circles highlight the integral button (\int) and the fraction button (c/d). The main workspace is divided into 'Worksheet' and 'Graphing' tabs. Under 'Worksheet', the input field contains the integral $\int_{-1}^1 \frac{5}{x} dx$. The output field shows the same integral $\int_{-1}^1 \frac{5}{x} dx$. Below the output fields is a large empty text area with 'Clear' and 'Enter' buttons.

g) $\sum_{n=1}^{\infty} \left(\frac{1}{3}\right)^n$

The screenshot shows the Microsoft Mathematics interface. On the left is a virtual calculator keypad with several buttons circled in red: the infinity symbol (∞), the summation symbol (Σ), the fraction template ($\frac{\square}{\square}$), the power template (\square^\square), and the division template ($\frac{\square}{\square}$). The main window is in 'Worksheet' mode. The 'Input' field contains the expression $\sum_{n=1}^{\infty} \left(\frac{1}{3}\right)^n$. The 'Output' field displays the result $\frac{1}{2}$. Below the output, the 'Decimal Output' is shown as 0.5. The bottom right of the window has 'Clear' and 'Enter' buttons.

h) $\sum_{n=1}^{\infty} \frac{1}{n}$

The screenshot shows the Microsoft Mathematics interface. On the left is a virtual calculator keypad with several buttons circled in red: the infinity symbol (∞), the summation symbol (Σ), the fraction template ($\frac{\square}{\square}$), the power template (\square^\square), and the division template ($\frac{\square}{\square}$). The main window is in 'Worksheet' mode. The 'Input' field contains the expression $\sum_{n=1}^{\infty} \frac{1}{n}$. The 'Output' field displays the result ∞ . The bottom right of the window has 'Clear' and 'Enter' buttons.

Poznámka 1. Pri výpočte niektorých typov radov je potrebné upraviť hornú hranicu a hodnotu ∞ modifikovať napr. na hodnotu 1000; 800; ...

i) $\rho = ?, \sum_{n=0}^{\infty} \frac{5^n x^n}{(n+1)^2}$

j) $\mathbf{A} \cdot \mathbf{B} = ?, \mathbf{A} = \begin{pmatrix} 177 & 135 & 136 \\ 129 & 84 & 113 \\ 123 & 113 & 76 \end{pmatrix}, \mathbf{B} = \begin{pmatrix} 20 \\ 25 \\ 40 \end{pmatrix}$

k) $h(\mathbf{A}) = ?$, $\mathbf{A}^{-1} = ?$, $\mathbf{A} = \begin{pmatrix} 1 & 0 & 2 \\ 2 & 1 & -1 \\ 1 & 1 & -2 \end{pmatrix}$

Worksheet 1

Input: $\text{reduce} \begin{pmatrix} 1 & 0 & 2 \\ 2 & 1 & -1 \\ 1 & 1 & -2 \end{pmatrix} \rightarrow ERÚ$

Output: $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \rightarrow h(\mathbf{A}) = 3$

Worksheet 2

Input: $\text{inverse} \begin{pmatrix} 1 & 0 & 2 \\ 2 & 1 & -1 \\ 1 & 1 & -2 \end{pmatrix}$

Output: $\begin{pmatrix} -1 & 2 & -2 \\ 3 & -4 & 5 \\ 1 & -1 & 1 \end{pmatrix}$

l) $|\mathbf{A}| = ?$, $\mathbf{A} = \begin{pmatrix} 4 & -1 & -1 \\ -1 & 2 & 0 \\ -1 & 0 & 0 \end{pmatrix}$

Worksheet 1

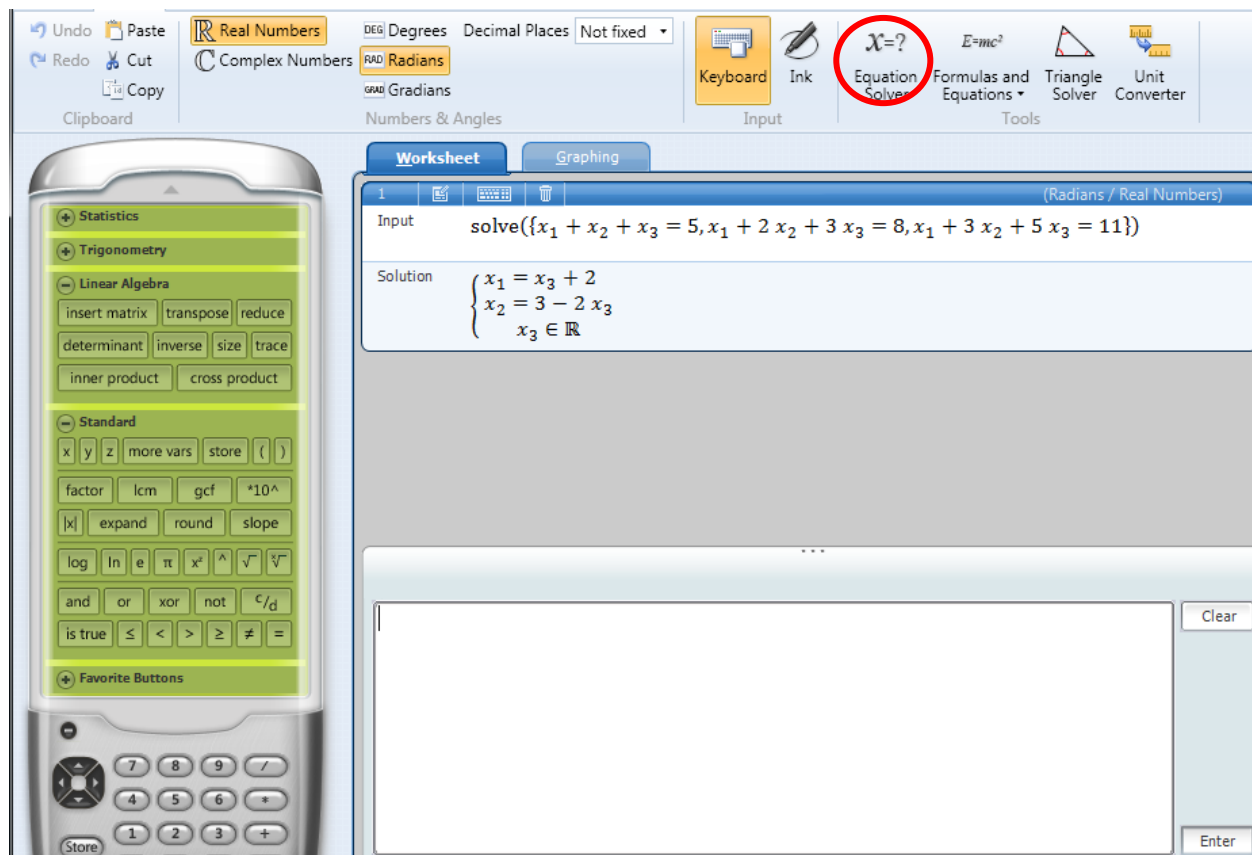
Input: $\text{det} \begin{pmatrix} 4 & -1 & -1 \\ -1 & 2 & 0 \\ -1 & 0 & 0 \end{pmatrix}$

Output: -2

$$1x_1 + 1x_2 + 1x_3 = 5$$

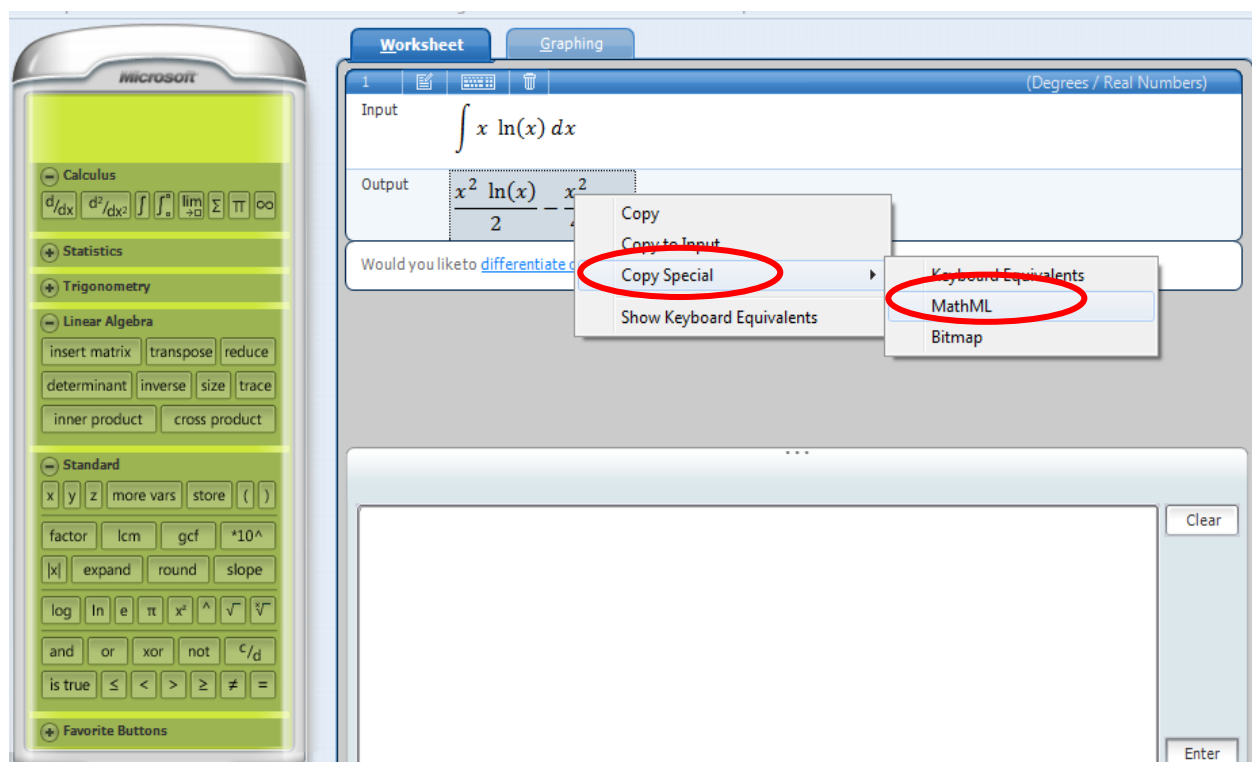
m) $x_1, x_2, x_3 = ?, 1x_1 + 2x_2 + 3x_3 = 8$

$$1x_1 + 3x_2 + 5x_3 = 11$$

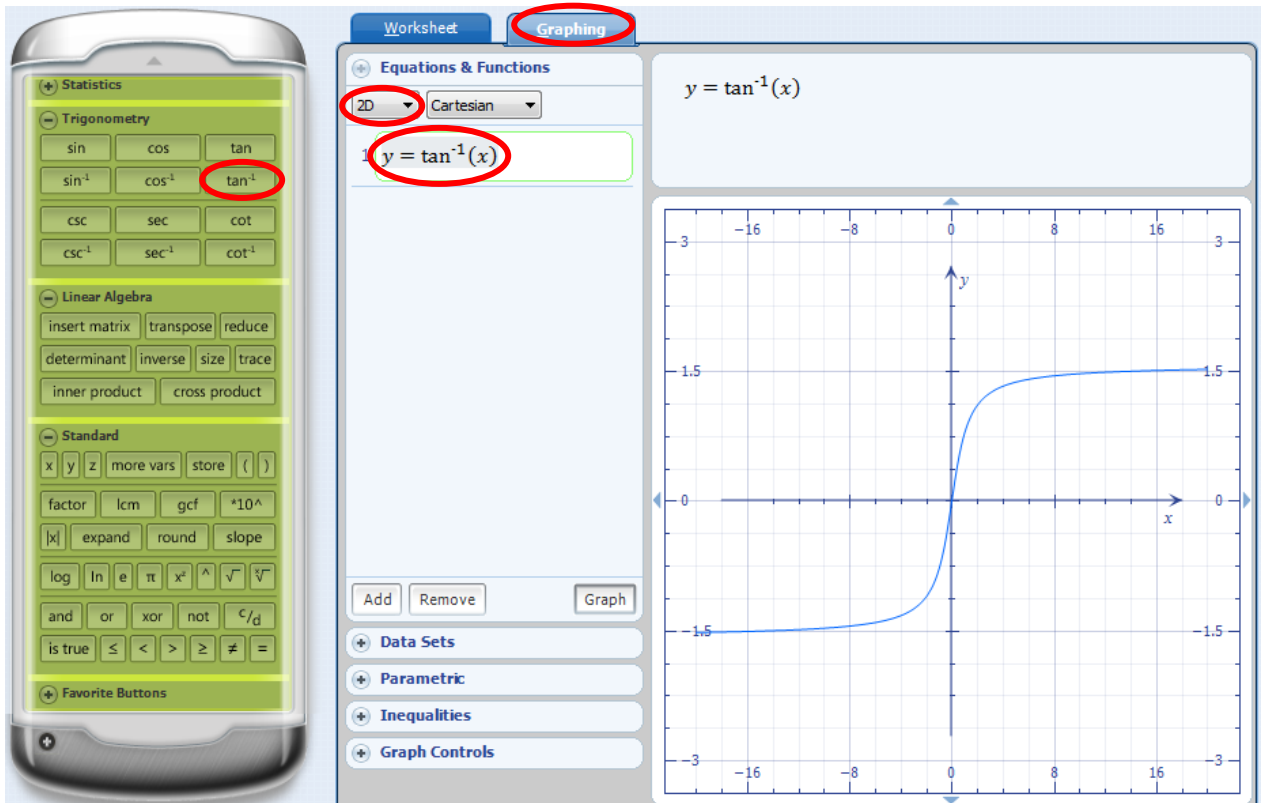


Poznámka 2. MS Mathematics rozpozná indexáciu x_1 pri zadaní premennej ako $x1$.

Poznámka 3. Kopírovanie vzorcov do prostredia MS Word (docx).



Poznámka 4. Príklad práce s 2D grafmi, $y = \arctg x$



Poznámka 5. Príklad práce s 3D grafmi, $z = x^2 + y^2$

