

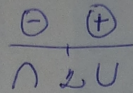
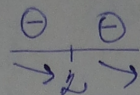
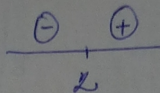
HA06/BA001: 2. ZÁPOČTOVÝ TEST - VĚZOR (sb. A)

①  $\lim_{x \rightarrow \infty} e^x \cdot x^{-1} = \lim_{x \rightarrow \infty} \frac{e^x}{x} = \left| \frac{\infty}{\infty} \right| = \lim_{x \rightarrow \infty} \frac{e^x}{1} = \underline{\underline{+\infty}}$

②  $f(x) = \frac{1}{x-2} = (x-2)^{-1}$ , NB: 2

$f'(x) = -\frac{1}{(x-2)^2}$ , NB: 2, 2

$f''(x) = \frac{2}{(x-2)^3}$ , NB: 2, 2, 2



kladná:  $x \in (2, +\infty)$

káporná:  $x \in (-\infty, 2)$

rozdáca:  $\forall$

lesafica:  $x \in (-\infty, 2) \cup (2, +\infty) \mathbb{R} \setminus \{2\}$

konvexní:  $x \in (2, +\infty)$

konkávni:  $x \in (-\infty, 2)$

③  $f(x) = \sin x, f(0) = 0$

$f'(x) = \cos x, f'(0) = 1$

$f''(x) = -\sin x, f''(0) = 0$

$f'''(x) = -\cos x, f'''(0) = -1$

$T_3(x) = 0 + 1(x-0) + 0 \cdot \frac{1}{2}(x-0)^2 + (-1) \cdot \frac{1}{6}(x-0)^3 =$   
 $= x - \frac{1}{6}x^3$

④  $\begin{pmatrix} 1 & -2 & -2 & | & 3 \\ 1 & 1 & 1 & | & -3 \\ 1 & -1 & 1 & | & -1 \end{pmatrix} \sim \begin{pmatrix} 1 & -2 & -2 & | & 3 \\ 0 & 3 & 3 & | & -6 \\ 0 & 1 & 3 & | & -4 \end{pmatrix} \sim \begin{pmatrix} 1 & -2 & -2 & | & 3 \\ 0 & 1 & 1 & | & -2 \\ 0 & 0 & 2 & | & -2 \end{pmatrix}$

$\kappa(A) = \kappa(A|\vec{b}) = 3 = 3$

↓  
jedné řešení

$x - 2y - 2z = 3 \Rightarrow x = -1$

$y + z = -2 \Rightarrow y = -1$

$2z = -2 \Rightarrow z = -1$

$\Rightarrow \vec{x} = \begin{pmatrix} -1 \\ -1 \\ -1 \end{pmatrix}$

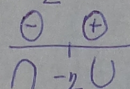
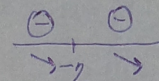
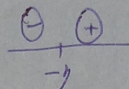
HA06/BA001: 2. ZÁPOČTOVÝ TEST - VĚZOR (sb. B)

①  $\lim_{x \rightarrow \infty} \ln x \cdot x^{-1} = \lim_{x \rightarrow \infty} \frac{\ln x}{x} = \left| \frac{\infty}{\infty} \right| = \lim_{x \rightarrow \infty} \frac{1}{x} = \lim_{x \rightarrow \infty} \frac{1}{x} = \underline{\underline{0}}$

②  $f(x) = \frac{1}{x+2}$ , NB: -2

$f'(x) = -\frac{1}{(x+2)^2}$ , NB: -2, -2

$f''(x) = \frac{2}{(x+2)^3}$ , NB: -2, -2, -2



kladná:  $x \in (-2, +\infty)$

káporná:  $x \in (-\infty, -2)$

rozdáca:  $x \in \emptyset$

lesafica:  $x \in \mathbb{R} \setminus \{-2\}$

konvexní:  $x \in (-2, +\infty)$

konkávni:  $x \in (-\infty, -2)$

③  $f(x) = \cos x, f(0) = 1$

$f'(x) = -\sin x, f'(0) = 0$

$f''(x) = -\cos x, f''(0) = -1$

$f'''(x) = \sin x, f'''(0) = 0$

$T_3(x) = 1 + 0(x-0) - 1 \cdot \frac{1}{2}(x-0)^2 + 0 \cdot \frac{1}{3}(x-0)^3 =$   
 $= 1 - \frac{1}{2}x^2$

④  $\begin{pmatrix} 1 & 1 & 1 & | & 6 \\ 1 & -1 & 1 & | & 2 \\ 1 & -2 & -2 & | & -6 \end{pmatrix} \sim \begin{pmatrix} 1 & 1 & 1 & | & 6 \\ 0 & 2 & 0 & | & 4 \\ 0 & 3 & 3 & | & 12 \end{pmatrix} \sim \begin{pmatrix} 1 & 1 & 1 & | & 6 \\ 0 & 1 & 0 & | & 2 \\ 0 & 0 & 3 & | & 6 \end{pmatrix}$

$\kappa(A) = \kappa(A|\vec{b}) = 3$

↓  
jedné řešení

$x + y + z = 6 \Rightarrow x = 2$

$y = 2$

$3z = 6 \Rightarrow z = 2$

$\Rightarrow \vec{x} = \begin{pmatrix} 2 \\ 2 \\ 2 \end{pmatrix}$