

1. a) ano
b) ne
c) ano
d) ano

2. a) LN
b) LZ
c) LN

3. a) LZ
b) LN

4. a) $r = 3$
b) pro žádné r z \mathbb{R}

5. a) $\text{Ker } A = \text{Span}\left\langle \begin{pmatrix} -1 \\ -1 \\ 1 \end{pmatrix} \right\rangle$, $\text{Im } A = \text{Span}\left\langle \begin{pmatrix} 1 \\ 3 \\ -1 \\ 2 \end{pmatrix}, \begin{pmatrix} 4 \\ -2 \\ 0 \\ 3 \end{pmatrix} \right\rangle$,
 $\text{R}(A) = \text{Span}\langle (1,4,5), (3,-2,1) \rangle$

- b)
c)

6. a) $\alpha = u_1, u_3$, $\dim M = 2$
b) $\alpha = u_1, u_4$, $\dim M = 2$
c) $\alpha = u_1, u_2, u_3, u_4$, $\dim M = 4$
d) $\alpha = u_1, u_2, u_5$, $\dim M = 3$
e) $\alpha = \{2x-1, x^3+x+1, x^2+x\}$, $\dim M = 3$

7. a) $A = \begin{pmatrix} -3 & -8 \\ 5 & 11 \end{pmatrix}$, $[w]_\alpha = \begin{pmatrix} -30 \\ 43 \end{pmatrix}$
b) $B = \begin{pmatrix} \frac{3}{4} & \frac{3}{4} & \frac{1}{12} \\ -\frac{3}{4} & -\frac{4}{2} & -\frac{17}{12} \\ 0 & \frac{2}{3} & \frac{2}{3} \end{pmatrix}$, $[w]_\alpha = \begin{pmatrix} \frac{11}{6} \\ -\frac{1}{2} \\ 2 \end{pmatrix}$
c) $C = \begin{pmatrix} 1 & -1 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$, $[w]_\alpha = 5x^2 - x - 2$