

Homework 6, due Friday 10/14

1. Consider the following vectors:

$$v_1 = \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix}, v_2 = \begin{pmatrix} 3 \\ 2 \\ 5 \\ 0 \end{pmatrix}, v_3 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 2 \end{pmatrix}, v_4 = \begin{pmatrix} 5 \\ 1 \\ 7 \\ -2 \end{pmatrix}, v_5 = \begin{pmatrix} 3 \\ 3 \\ 5 \\ 2 \end{pmatrix}$$

- Show that $(6 \ 3 \ 9 \ -2)^t$ lies in the span of v_1, \dots, v_5 .
- Show that v_1, \dots, v_5 are linearly dependent.
- Find a basis for \mathbb{R}^4 which contains as many vectors from $\{v_1, \dots, v_5\}$ as possible.

2. Give examples

- for three vectors which span \mathbb{R}^3 ,
- for three vectors which do not span \mathbb{R}^3 ,
- for four vectors which span \mathbb{R}^3 ,
- for four vectors which do not span \mathbb{R}^3 .

3. p. 193, problem 3.

4. p. 194, problems 5, 9, 15.

5. p. 204, problems 3, 4, 5. Determine the dimension for each of these spaces.

6. p. 205, problems 11, 12, 14.

7. Let

$$B_1 := \left\{ \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}; \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}; \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \right\}, B_2 := \left\{ \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}; \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}; \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \right\}.$$

What is $c_{B_1}(v)$ and $c_{B_2}(v)$ for $v = (v_1 \ v_2 \ v_3)^t$?