

## Homework 6, due Friday 10/8

1. Consider the following vectors:

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

- (a) Show that  $(6 \ 3 \ 9 \ -2)^t$  lies in the span of  $v_1, \dots, v_5$ .  
(b) Show that  $v_1, \dots, v_5$  are linearly dependent.
2. Consider the following vectors:

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

- (a) Determine whether  $(1 \ 0 \ 2 \ 0 \ 0)^t$  lies in the span of  $v_1, v_2, v_3$ .  
(b) Determine whether  $v_1, v_2, v_3$  are linearly independent.
3. Give examples
- (a) for three vectors which span  $\mathbb{R}^3$ ,
  - (b) for three vectors which do not span  $\mathbb{R}^3$ ,
  - (c) for four vectors which span  $\mathbb{R}^3$ ,
  - (d) for four vectors which do not span  $\mathbb{R}^3$ .
4. p. 193, problem 3.
5. p. 194, problems 5, 9, 15.