February 22, 2005 Lecturer Dmitri Zaitsev Hilary Term 2005

Course 2E1 2004-05 (SF Engineers & MSISS & MEMS)

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Due: in the tutorial sessions next Wednesday/Thursday

Exercise 1

Which of the following sets of vectors are linearly dependent?

(i) $(0,1)$, $(0,2)$;
(ii) $(0,1)$, $(0,2)$, $(1,2)$;
(iii) $(0,1,0)$, $(0,2,1)$, $(1,2,0)$;
(iv) $(0,1,-1)$, $(1,2,0)$, $(1,0,2)$;
(v) $(0,0,0,0)$, $(1,1,1,1)$.

Exercise 2

For which real values of λ do the following vectors form a linearly dependent set in $\mathbb{R}^3$?

$$\mathbf{v}_1 = (\lambda, 1, 1), \quad \mathbf{v}_2 = (1, \lambda, 1), \quad \mathbf{v}_3 = (1, 1, \lambda).$$

Exercise 3

Which of the following sets of vectors are bases for the corresponding space $\mathbb{R}^n$? (The dimension n should be clear from the length of vectors.)

(i) $(1,0)$;
(ii) $(1,0)$, $(1,1)$;
(iii) $(1,-1)$, $(-1,1)$;
(iv) $(1,1)$, $(1,-1)$, $(-1,-1)$;
(v) $(1,0,0,1)$, $(1,2,3,4)$, $(4,3,2,1)$;
(vi) $(1,0,1)$, $(0,1,1)$, $(1,1,0)$.