

Course 2E02 2010 (SF Engineers & MSISS & MEMS)

Sheet 4

Due: at the end of the tutorial

Exercise 1

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

Exercise 2

Find the coordinates of the vector \mathbf{v} with respect to the basis $\mathbf{v}_1, \dots, \mathbf{v}_n$ (i.e. the coefficients k_1, \dots, k_n in the representation $\mathbf{v} = k_1\mathbf{v}_1 + \dots + k_n\mathbf{v}_n$):

- (i) $\mathbf{v} = (-1, 3), \mathbf{v}_1 = (-1, 1), \mathbf{v}_2 = (-1, 2)$;
- (ii) $\mathbf{v} = (2, -1, 1), \mathbf{v}_1 = (1, 1, 0), \mathbf{v}_2 = (1, 0, 1), \mathbf{v}_3 = (0, 1, 1)$;
- (iii) $\mathbf{v} = (1, -1, 2, 2), \mathbf{v}_1 = (1, 0, 0, 0), \mathbf{v}_2 = (1, 1, 0, 0), \mathbf{v}_3 = (0, 0, 1, 0), \mathbf{v}_4 = (1, 0, 1, 1)$.