Norwegian University of Science and Technology
Departement of Mathematical Sciences

TMA4110
Calculus 3
Autumn 2010

Exercise set 9 – Week 43

Edwards & Penney, section 4.2

11,19,25

Edwards & Penney, section 4.3

5,13,18

Exam problems

A-46 Let $V \subset \mathbb{R}^4$ be the space of solutions of the equation

$$x_1 + x_2 + x_3 + x_4 = 0$$

Find a basis for V, and determine its dimension.

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4 For this exercise, we are going to study the matrix

$$A = \begin{bmatrix} a & 2 & 1 \\ 1 & a & 0 \\ 1 & 0 & 1 \end{bmatrix}$$

a) For which values of the constant a is the matrix A invertible?

b) For which values of t does the system

$$\begin{aligned} 2x + 2y + z &= 1 + t \\ x + 2y \quad\;\; &= 2 + t \\ x \qquad\; + z &= 3 + t \end{aligned}$$

have a solution?

c) Find a basis for the null space of the matrix $\begin{bmatrix} -1 & 2 & 1 \\ 1 & -1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$.

Multiple-choice questions

1 Which of the following equations define a subspace of $\mathbb{R}^2$?

A: $x - y = 1$ **B:** $x + y = 0$ **C:** $xy = 0$ **D:** $x^2 + y^2 = 1$

2 For which value(s) of c are the vectors $\mathbf{v}_1 = (1, 3, -3)$, $\mathbf{v}_2 = (-2, 4, 1)$, $\mathbf{v}_3 = (-1, 1, c)$ linearly independent?

A: no value of c **B:** $c = 1$ **C:** $c \neq 1$ **D:** all values of c