TMA4110
Calculus 3
Autumn 2010

Norwegian University of Science and
Technology
Departement of Mathematical Sciences

Exercise set 12 – Week 46

Edwards & Penney, section 6.1

22,26,29

Edwards & Penney, section 6.2

15,26,32

Edwards & Penney, section 6.3

7,28,29

Exam problems

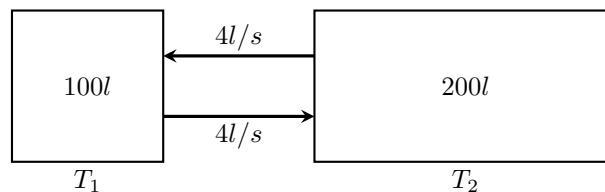A-51 Suppose that A is a square matrix satisfying

$$A^2 - 3A + 2I = 0$$

where I is the identity matrix, and 0 is the zero matrix. Show that A is invertible, and express A^{-1} using A and I.

Aug. 2002, problem 6 **a)** Find the eigenvalues and associated eigenvectors for the matrix

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

What are the eigenvalues and eigenvectors of the matrix kA, if $k \neq 0$ is a constant?

b)

At time $t = 0$, the tank T_1 contains 100 liters of pure water, and tank T_2 contains 200 liters of water with 30 kg of salt dissolved. The solution flows between the tanks at a rate of 4 liters per second. Determine the quantities of salt $x_1(t)$ and $x_2(t)$ in each of the tanks for all $t > 0$.