Norwegian University of Science and Technology
Departement of Mathematical Sciences

TMA4110 Calculus 3 Autumn 2010

Exercise set 6 – Week 40

Edwards & Penney, section 1.4

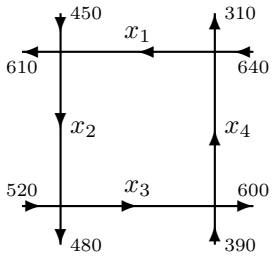
9,20,34,39,40

Edwards & Penney, section 1.5

17,22,32

Exam problems

A-22 In a certain city, there are four one-way streets crossing each other as in the figure. You will also see indicated the number of cars that pass each hour.



Show that $\mathbf{x} = (x_1, x_2, x_3, x_4)$ satisfies a (linear) system of equations of the form

$$A\mathbf{x} = \mathbf{b}$$

and solve it. What is x_1, x_2 and x_3 if $x_4 = 200$?

A-23 Each year, in the city of Patos, 30 % of the married women are divorced, and 20 % of the unmarried ones get married. At present, there are 8000 married women and 2000 unmarried women. Suppose that the total number of women remain constant. According to local laws, a woman can only marry or divorce once a year.

Show how the number of married and unmarried women after n years determine the number of married and unmarried women after $(n+1)$ years. Use this to calculate how many married and unmarried women there are after 1, 2 and 3 years, respectively.

Multiple-choice questions

1 Find AB, given the 2×2-matrices $A = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ -1 & 1 \end{bmatrix}$.

A: $\begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix}$ **B:** $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ **C:** $\begin{bmatrix} 3 & 2 \\ 0 & -1 \end{bmatrix}$ **D:** $\begin{bmatrix} 3 & 2 \\ 0 & 1 \end{bmatrix}$

2 For what value of the constant c is the 2×2-matrix $\begin{bmatrix} -1 & 1 \\ c & 2 \end{bmatrix}$ not invertible?

A: $c = 0$ **B:** $c = -2$ **C:** $c = 2$ **D:** $c = -1/2$