MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

ASSIGNMENT 6 **MATH 2050 sect. 3** DUE FRI OCT 27

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1. For each of the following elementary matrices describe the corresponding elementary row operation and write the inverse

(a) $\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ -4 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 2 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 10 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

2. Find an invertable matrix U such that $UA = R$ is in reduced row-echelon form, and express U as a product of elementary matrices

(a) $\begin{bmatrix} 1 & 2 & -1 & 0 \\ 3 & 1 & 1 & 2 \\ 1 & -3 & 3 & 2 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 1 \\ 2 & 1 & 6 \end{bmatrix}$

3. Suppose B is obtained from A by the following ERO. In each case describe how to obtain B^{-1} from A^{-1}.

a) interchanching rows i and j;

b) multiplying row j by $a \neq 0$;

c) adding a times row j to row $i \neq j$;

4. For each of the following matrices explain why it is stochastic and find the steady-state vector

(a) $\begin{bmatrix} .8 & 0 & .2 \\ .1 & .6 & .1 \\ .1 & .4 & .7 \end{bmatrix}$ (b) $\begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 0 & 1/2 & 1/4 \\ 1/2 & 1/4 & 1/2 \end{bmatrix}$

5. Bob has a linear algebra class on MWF each week. Bob makes it to LA class on time one Monday out of four. (Don't be a Bob!) If he is late one day he is twice as likely to come to the next LA class on time. If he is on time one LA class he is as likely to be late as not the next LA class. Find the probability of his being late and that of his being on time on Fridays.

6. Compose a word problem which leads to the Markov chain with one of the stochastic matrices given in Problem 4 above.