M146 Sample #04 for Quiz April 20, 2006 Name: ....

(1) find all solutions of
$$\begin{array}{rcrcr} x_1 & + & 2x_2 & = & 1 \\ 2x_1 & + & 7x_2 & = & 8 \end{array}$$

(2) $A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$ $\qquad b = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$. Calculate $A \cdot b$.

(3) Find all solutions of
$$\begin{array}{rcrcr} 1x_1 & + & 2x_2 & = & 4 \\ 3x_1 & + & 6x_2 & = & 1 \end{array}$$

(4) Find all solutions of
$$\begin{array}{rcrcr} 1x_1 & + & 2x_2 & = & 0 \\ 3x_1 & + & 6x_2 & = & 0 \end{array}$$

(5a) Let $A = \begin{bmatrix} 1 & -1 & 4 \\ -2 & 1 & 3 \\ 3 & 2 & -5 \end{bmatrix}$ and $b = \begin{bmatrix} 1 \\ 3 \\ -2 \end{bmatrix}$. Calculate $A \cdot b$.

(5b) Let $A = \begin{bmatrix} 1 & -1 & 4 \\ -2 & 1 & 3 \\ 3 & 2 & -5 \end{bmatrix}$ and $b = \begin{bmatrix} 1 \\ 3 \\ -2 \end{bmatrix}$. Find all solutions to $Ax = b$.

(6) A population is divided into calves, yearlings, adults. The Leslie matrix for this population distribution is: $L = \begin{bmatrix} 0 & 0 & 2.5 \\ 0.5 & 0 & 0 \\ 0 & 0.4 & 0.5 \end{bmatrix}$.

(6a) Describe the meaning of each of the numbers in this matrix.

(6b) The inutial population distribution is $\begin{bmatrix} 100 \\ 100 \\ 200 \end{bmatrix}$. What happens after 1 year? 2 years?

(6c) One eigenvalue (the largest) for L is $\lambda = 1.0$. Find a vector $x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$, with $x_1 + x_2 + x_3 = 760$ so that $Lx = 1.0x$