

The University of Calgary
Department of Mathematics and Statistics
Math 211 L60 Summer 2009 Thursday Lab (July 16, 2009)
Quiz # 2 Duration: 50 minutes
[marks] Total marks = 30

Name: _____ I.D.#: _____

1. [8] Find basic solutions (to the associated homogeneous system) and a particular solution to the following system.

$$\begin{cases} 3x_1 + x_2 + x_3 - 2x_4 = -2 \\ x_1 + x_2 - 2x_3 - x_4 = -2 \\ 2x_1 + x_2 - x_3 - x_4 = -1 \end{cases} .$$

2. [4] Given $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -3 & 2 \\ -2 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ -3 & 2 \\ 1 & -1 \end{bmatrix}$, compute the products $B^T A$, AB , $B^T B$ and BB^T .

3. (a) [2] Find the adjacency matrix of a graph with vertices v_1 , v_2 and v_3 if the edges are $v_2 \rightarrow v_2$, $v_2 \rightarrow v_3$, $v_3 \rightarrow v_1$, $v_1 \rightarrow v_3$ and $v_1 \rightarrow v_2$.

- (b) [2] Find the number of paths of length 3 from vertex v_2 to v_1 .

4. [4] Write the following system in matrix form and use a matrix inverse to solve it: $\begin{cases} 4x + 3y = 1 \\ 5x - 4y = 9 \end{cases}$.

5. [2] Find A if $(2A^{-1} + I_2)^T = \begin{bmatrix} 3 & 4 \\ 2 & 3 \end{bmatrix}$; ($I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is the identity matrix)

6. [8] Find the inverse A^{-1} of the 3×3 matrix

$$A = \begin{bmatrix} 4 & 3 & 5 \\ 5 & 4 & 7 \\ 1 & 1 & 1 \end{bmatrix}.$$