Dawson College: Linear Algebra: 201-NYC-05-S07: Winter 2010

Name: Y. Lamontagne
Student ID: _____

Quiz 4

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(1 mark)* Find a nonzero 3×3 matrix A such that $A^t = A$.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$$

Question 2. *(2 marks)* Find A^{-1} if a A square matrix satisfies $A^2 - 4A - I = 0$

notice! $A^2 - 4A = I$ and $(A - 4I)A = I$

$A(A - 4I) = I$

$\therefore A^{-1} = A - 4I$

Question 3. *(7 marks)* Solve for the matrix A:

$$(3I + 2A^t)^{-1} = \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$$

$$\left((3I + 2A^t)^{-1}\right)^{-1} = \begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}^{-1}$$

$$3I + 2A^t = \frac{1}{1 - 2(3)} \begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$$

$$2A^t = \begin{bmatrix} \frac{-1}{5} & \frac{2}{5} \\ \frac{3}{5} & \frac{-1}{5} \end{bmatrix} - 3 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$2A^t = \begin{bmatrix} \frac{-16}{5} & \frac{2}{5} \\ \frac{3}{5} & \frac{-16}{5} \end{bmatrix}$$

$$A^t = \begin{bmatrix} \frac{-8}{5} & \frac{1}{5} \\ \frac{3}{10} & \frac{-8}{5} \end{bmatrix}$$

$$\left(A^t\right)^t = \begin{bmatrix} \frac{-8}{5} & \frac{1}{5} \\ \frac{3}{10} & \frac{-8}{5} \end{bmatrix}^t$$

$$A = \begin{bmatrix} \frac{-8}{5} & \frac{3}{10} \\ \frac{1}{5} & \frac{-8}{5} \end{bmatrix}$$