Homework Assignment 2 in MATH309-Spring 2013, ©Igor Zelenko

due January 30, 2013

Sections covered: 1.3, 1.4

1. If
$$A = \begin{pmatrix} 2 & -1 & 5 \\ -3 & 4 & 1 \\ 6 & -5 & -4 \end{pmatrix}, B = \begin{pmatrix} -2 & 3 & -4 \\ 4 & -3 & -1 \\ 2 & -1 & -3 \end{pmatrix}$$
   compute

   (a) Compute $3A - BA$;

   (b) $A^T B^T$

   (c) $(BA)^T$

2. For each of the pairs of matrices A and B that follow, determine whether the matrix multiplications AB and BA make sense. Then compute the matrix multiplication, if it makes sense (for example, if AB makes sense and BA does not, compute AB, if both of them make sense, compute both).

   (a) $A = \begin{pmatrix} 1 & 5 & -4 \\ 2 & -7 & 8 \end{pmatrix}, B = \begin{pmatrix} 4 & -3 \\ -2 & 1 \\ 3 & -4 \end{pmatrix}$;

   (b) A is as in the previous item and $B = \begin{pmatrix} 4 & -3 \\ -2 & 1 \end{pmatrix}$;

   (c) $A = \begin{pmatrix} 2 \\ -1 \\ -4 \end{pmatrix}, B = \begin{pmatrix} -3 & 10 & -1 \end{pmatrix}$.

3. Let $A = \begin{pmatrix} 1 & 4 \\ -2 & 5 \end{pmatrix}, \mathbf{b} = \begin{pmatrix} 3 \\ -4 \end{pmatrix}$ Write b as a linear combination of the column vectors $\mathbf{a}_1$ and $\mathbf{a}_2$ of A

4. Let A be a 3×5 matrix. If $\mathbf{b} = 3\mathbf{a}_1 - 4\mathbf{a}_2 + 5\mathbf{a}_3 - 6\mathbf{a}_4 + 7\mathbf{a}_5$, then what can you conclude about the number of solutions of the system $A\mathbf{x} = \mathbf{b}$.

4-5. Section 1.4, problems 3 and 4, page 56

6. (a) Use the result of the Exercise 12 on page 56 (also discussed in class) to find the inverse of the matrix $A = \begin{pmatrix} 9 & -8 \\ -10 & 9 \end{pmatrix}$.

   (b) Use the result of the previous item to solve the linear system $A\mathbf{x} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$.

7-8. Solve any two of the following 4 problems from the textbook: Section 1.4, problems 14,15, 16 page 56, problem 21 page 57 (if you solve three of them **you get bonus 10 points**, if you solve all four **you get bonus 20 points**)