Homework 2, due Friday 9/9

Note: You can use Gauss elimination or Gauss Jordan elimination or any 'in between' method for the homework problems (3) to (10).

1. Give examples of 2×2–matrices A and B such that $(AB)^{-1} \neq A^{-1}B^{-1}$.
2. (a) What does a 3×3–matrix A look like which has the property that $A = A^t$?
   (b) What does a $p \times p$–matrix A look like which has the property that $A = A^t$?
   (c) In general a matrix with $A = A^t$ is called symmetric, why do you think this name was chosen?
3. Assume A is symmetric, show that BAB^t is symmetric for any matrix B. (Hint: use the properties of taking transposes, then the proof is just one line).
4. p. 93, problems 1 (a), 4
5. p. 94, problems 8 (a), 10
6. p. 99, problem 1
7. Find all solutions for the following equation system:

$$\begin{array}{rcrcrcl} 2x_1 & + & 2x_2 & + & 4x_3 & = & 0 \\ x_1 & + & 2x_2 & + & 3x_3 & = & 5 \\ & & 2x_2 & + & 2x_3 & = & 7 \end{array}$$

8. Find all solutions for the following equation system:

$$\begin{array}{rcrcrcl} & & 2x_2 & + & 2x_3 & = & 10 \\ 2x_1 & + & 2x_2 & + & 4x_3 & = & 0 \\ 3x_1 & + & 4x_2 & + & 7x_3 & = & 5 \end{array}$$

9. p. 102, problem 1
10. Does the inverse of $A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ exist? If yes, then compute it.