

21001, Section 01, Linear Algebra and applications
HW 2, DUE Wednesday, February 9
Instructor: Prof. Artem Zvavitch
GOOD LUCK!!!

Problem 1. *Let*

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 2 & 2 \end{bmatrix}, B = \begin{bmatrix} 0 & -1 & 2 \\ 0 & 1 & 2 \\ 1 & 2 & 2 \end{bmatrix}, C = \begin{bmatrix} -5 & -1 & 2 \\ 1 & -3 & 1 \\ 0 & 2 & -2 \end{bmatrix}.$$

Find

$$AB + AC + 2A - BA.$$

Problem 2. *Find an example of 2×2 matrices A and B such that*

- a) $AB \neq BA$.
- b) $AB = BA$.
- c) $A^2 = 0$, but $A \neq 0$.
- d) $A^T = A$.

Problem 3. *Matrix C is called symmetric if $C = C^T$. Prove (explain) that $A + A^T$ is a symmetric matrix, for any $n \times n$ matrix A .*