Homework assignment 2
Due date: September 15

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Exercise 2. Find a row-reduced echelon matrix that is equivalent to

$$A = \begin{pmatrix} 1 & -i \\ 2 & 2 \\ i & 1+i \end{pmatrix}.$$

What are the solutions of $AX = 0$?

Exercise 3. Descibe explicitly all 2×2 row-reduced echelon matrices.

Exercise 5. Give an example of a system of two linear equations in two unknowns that has no solutions.

Exercise 7. Find all solutions of

$$\begin{array}{rrrrrr} 2x_1 - & 3x_2 - & 7x_3 + & 5x_4 + & 2x_5 = & -2 \\ x_1 - & 2x_2 - & 4x_3 + & 3x_4 + & x_5 = & -2 \\ 2x_1 & - & 4x_3 + & 2x_4 + & x_5 = & 3 \\ x_1 - & 5x_2 - & 7x_3 + & 6x_4 + & 2x_5 = & -7. \end{array}$$

Exercise 9. Let

$$A = \begin{pmatrix} 3 & -6 & 2 & -1 \\ -2 & 4 & 1 & 3 \\ 0 & 0 & 1 & 1 \\ 1 & -2 & 1 & 0 \end{pmatrix}.$$

For which (y_1, y_2, y_3, y_4) does the system $AX = Y$ have a solution?

Bonus Exercise 10. Suppose R and R' are 2×3 row-reduced echelon matrices and that the systems $RX = 0$ and $R'X = 0$ have exactly the same solutions. Prove that $R = R'$.