MATH 2270-2

Additional homework to be handed in Friday October 26:

section 5.4 page 223, #22, 23; (matrix least squares)

and the following "fundamental subspaces" problem:

\[ \text{Problem I: Let } L(x) = Ax, \text{ for the matrix } A \text{ defined by} \]

\[ A := \begin{bmatrix}
1 & 0 & -1 & 2 & 3 \\
3 & 2 & -2 & 1 & -1 \\
1 & 2 & 0 & -3 & -7 \\
0 & -2 & -1 & 5 & 10
\end{bmatrix} \]

1a) Find bases for the four fundamental subspaces associated to this map (and matrix). In the domain space you will be looking for the kernel of \( A \) and the row space of \( A \). In the codomain you want the image of \( A \) (column space), and the kernel of the transpose of \( A \). You should be able to deduce all of your answers from

\[ \text{rref}(A); \]

\[ \text{rref}(\text{ transpose}(A)); \]

1b) Verify that the two domain spaces are perpendicular to each other, and that the two codomain spaces also are, by checking orthogonality between the bases you found in part (a).