Day 12

(1) Find a unitary 2×2 whose first column is a positive multiple of $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$. Then find the other one.

(2) Is $\begin{bmatrix} 0 & -1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ unitary?

(3) Find a subset of the columns of

$$A = \begin{bmatrix} 2 & 4 & -3 & -9 & -1 & -17 \\ 3 & -6 & 13 & 56 & 3 & 87 \\ 1 & -2 & 3 & 12 & 1 & 21 \end{bmatrix}$$ that is linearly independent and spans $C(A)$, using $A \xrightarrow{\text{RREF}} \begin{bmatrix} 1 & 2 & 0 & 3 & 0 & 4 \\ 0 & 0 & 1 & 5 & 0 & 6 \\ 0 & 0 & 0 & 0 & 1 & 7 \end{bmatrix}$

(4) Find a finite set of vectors that is lin. indep. and whose span equals

$$\left\langle \left\{ \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 3 \\ 2 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 7 \\ 9 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 9 \\ 0 \\ 0 \end{bmatrix} \right\} \right\rangle.$$

(5) Find an indep. spanning set of

$$\left\langle \left\{ \begin{bmatrix} 1 \\ 0 \\ -1 \\ 4 \end{bmatrix}, \begin{bmatrix} -1 \\ -6 \\ 11 \\ 0 \end{bmatrix}, \begin{bmatrix} 3 \\ 16 \\ -29 \\ -2 \end{bmatrix}, \begin{bmatrix} 0 \\ 4 \\ -6 \\ 2 \end{bmatrix} \right\} \right\rangle$$ using

$$\begin{bmatrix} 1 & 0 & -1 & 3 \\ 0 & 4 & -6 & 16 \\ -1 & -6 & 11 & -29 \\ 4 & 2 & 0 & -2 \end{bmatrix} \xrightarrow{\text{RREF}} \begin{bmatrix} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$