PRACTICE 3m: For each of the following subsets of $\mathbb{C}^3$, determine (a) if they are a spanning set for $\mathbb{C}^3$, (b) if they are linearly independent, and (c) if they are a basis for $\mathbb{C}^3$.

(1) $A = \left\{ \begin{bmatrix} 1 \\ 2+3i \\ -1-i \end{bmatrix}, \begin{bmatrix} 1-i \\ 3+2i \\ 4-i \end{bmatrix} \right\}$

(2) $B = \left\{ \begin{bmatrix} 1 \\ 2+i \\ 4i \end{bmatrix}, \begin{bmatrix} 0 \\ i \\ 1+3i \end{bmatrix}, \begin{bmatrix} 1-i \\ 3-i \\ 4+4i \end{bmatrix} \right\}$

(3) $C = \left\{ \begin{bmatrix} i \\ i \\ i \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ i \end{bmatrix}, \begin{bmatrix} -1 \\ 2i \\ -1 \end{bmatrix} \right\}$ (Note that this is question B3(b) in the text.)

(4) $D = \left\{ \begin{bmatrix} 1 \\ i \\ 1+i \end{bmatrix}, \begin{bmatrix} -2i \\ 2 \\ 2-2i \end{bmatrix}, \begin{bmatrix} 2i \\ 0 \\ 3i \end{bmatrix}, \begin{bmatrix} 0 \\ 2 \\ 2+i \end{bmatrix} \right\}$