

## Assignment 10

[1pt] 1. Compute  $(1+i) \begin{bmatrix} 2 \\ -3i \end{bmatrix} + (3i) \begin{bmatrix} 2+i \\ 2-i \end{bmatrix}$ .

[3pt] 2. Prove that the mapping  $L : \mathbb{C}^2 \rightarrow \mathbb{C}^3$  defined by

$$L(z_1, z_2) = (z_1 + z_2, z_1 + iz_2, z_1 + (1+i)z_2)$$

is a linear mapping, and find its standard matrix  $[L]$ .

[3pt] 3. Determine if the set  $A = \left\{ \begin{bmatrix} 1 \\ 2 \\ -i \end{bmatrix}, \begin{bmatrix} 0 \\ 1+i \\ 3 \end{bmatrix}, \begin{bmatrix} -1 \\ -4i \\ -i \end{bmatrix} \right\}$  is  
(a) a spanning set for  $\mathbb{C}^3$ , (b) linearly independent, and (c) a basis for  $\mathbb{C}^3$ .

[3pt] 4. Find a basis for the row space, column space, and nullspace of the matrix

$$\begin{bmatrix} 1 & 2+i & 1-i & 0 \\ 2i & -2+4i & 2+i & -i \\ -3 & -6-3i & -1-i & 2-4i \end{bmatrix}$$