We have shown that the set of all functions of the form

\[ f(\theta) = a \sin \theta + b \cos \theta \]

where \( a \) and \( b \) are arbitrary complex numbers form a linear space.

Do the functions of the form

\[ f(\theta) = a_1 \sin \theta + a_2 \sin 2\theta + a_3 \sin 3\theta + ... \]

\[ = \sum_{n=1}^{\infty} a_n \sin n\theta \]

where \( a_i \) are arbitrary complex numbers form a linear space?