Exercise 1

Use the Gram-Schmidt process to transform the given basis \( \{ \mathbf{u}_1, \ldots, \mathbf{u}_n \} \) into orthogonal one:

(i) \( \mathbf{u}_1 = (3, 4), \mathbf{u}_2 = (3, -4) \);

(ii) \( \mathbf{u}_1 = (1, 1, 0), \mathbf{u}_2 = (1, 0, 1), \mathbf{u}_3 = (1, 0, -2) \);

(iii) \( \mathbf{u}_1 = (1, 1, 0, 0), \mathbf{u}_2 = (1, 0, 1, 0), \mathbf{u}_3 = (1, 0, -2, 0), \mathbf{u}_4 = (1, 0, 0, 1) \);