

# MA8014 Advanced Methods in Scientific computing

## Assignment 1

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Consider the linear system

$$Ax = b.$$

Two examples can be found in the course webpage, including the matrix  $A$  and the right-hand side  $b$ . For the first example,  $A$  is a full matrix and the matrix is saved in a vector form of column by column. The second example is a complex system, in which both  $A$  and  $b$  are complex, where the matrix  $A$  is saved in a sparse form.

1. Write a code of either BiCG or restarted GMRES for general real linear system and then, apply your code to solve the system in example 1.
2. Use either BiCG or restarted GMRES code in matlab package to solve both example 1 and example 2 in the course webpage.
- 3 (optional). If possible, please try to use ILU() preconditioning technique (using matlab package) to improve your results.