Assignment for C3

Please write an algorithm and code for the assigned problems:

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1. Make a program to solve a system of linear equations which contains 3 equations and 4 unknowns, using Gauss-Jordan elimination method, which also gives the dimension of its solutions space.
2. Make a program to write Jordan canonical form of 3×3 matrix.
3. Make a program to determine singular value decomposition (SVD) of a given 2×3 matrix.
4. Make a program for 3×3 matrix A to determine:
   (a) the characteristic polynomial, eigenvalues,
   (b) AM and GM of eigenvalues,
   (c) check whether it is diagonalizable.
   (d) If it is diagonalizable, find a non-singular matrix S such that $S^{-1}AS$ is diagonalizable.
5. Make a program for 3×3 matrix A to determine:
   (a) the characteristic polynomial, eigenvalues,
   (b) AM and GM of eigenvalues,
   (c) check whether it is diagonalizable.
   (d) find the minimal polynomial of A.
6. Make a program for Gram-Schmidt process to convert a linearly independent subset S of $\mathbb{R}^4$ to an orthonormal subset.
7. Make a program to find the row reduced echelon form of a 4×3 matrix A, which also gives the rank of A.
8. Make a program to determine whether a 3×3 matrix is invertible or not. Further this program should give the inverse of A, if it is invertible.
9. Make a program for 3×2 matrix A to obtain non-singular matrices P and Q such that PAQ gives the normal form.
10. Make a program to find a basis and the dimension of $S^{\perp}$, where S is a linearly independent subset of $\mathbb{R}^4$.
11. Make a program to identify a real quadratic curve.
12. Make a program to determine the definiteness of a 3×3 matrix.

13. Make a program to determine the possible number of Jordan canonical form for given 3×3 matrix.

14. Make a program to find orthogonal matrix P such that $P^{-1}AP$ is a diagonal matrix, where A is a symmetric matrix.

15. Make a program to write a 3×3 matrix into product of elementary matrices.