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# 1 Matrices

## Learning Outcomes

After completing this chapter, students should be able to do the following.

- Perform addition and scalar multiplication of matrices.
- Give the dimensions of a matrix product, and compute the product.
- Discuss associativity and noncommutativity of matrix multiplication.
- Interpret a matrix-vector product as a linear combination of the columns of the matrix.
- Employ block multiplication of matrices, when advantageous.
- Compute the transpose of a matrix.
- Express a solution to a system of linear equations as a sum of a particular solution and a solution to the associated homogeneous system.
- Compute the inverse of a matrix using elementary row operations.
- Solve systems of linear equations using the inverse of the coefficient matrix, when possible.
- Create elementary matrices corresponding to each of the elementary row operations
- Solve a system of equations using LU factorization.