## Exercise Sheet 1: Introduction to Cloud Computing

## 0.1 Example Problem

In a computer graphics application, a 3D object is represented by a matrix M. Describe how matrix multiplication can be used to transform the object (e.g., rotate, scale, translate).

## Solution

Matrix multiplication can be used to transform a 3D object in computer graphics by representing the transformation as a matrix. For example:

- Rotation: A rotation about the origin can be represented by a rotation matrix R. To rotate a point  $\mathbf{p}$ , we multiply R by  $\mathbf{p}$ .
- Scaling: A scaling transformation can be represented by a scaling matrix S. To scale a point  $\mathbf{p}$ , we multiply S by  $\mathbf{p}$ .
- Translation: A translation can be represented by a translation matrix T. To translate a point  $\mathbf{p}$ , we add a translation vector to  $\mathbf{p}$ .

Combining these transformations, we can create complex transformations by multiplying the respective matrices.