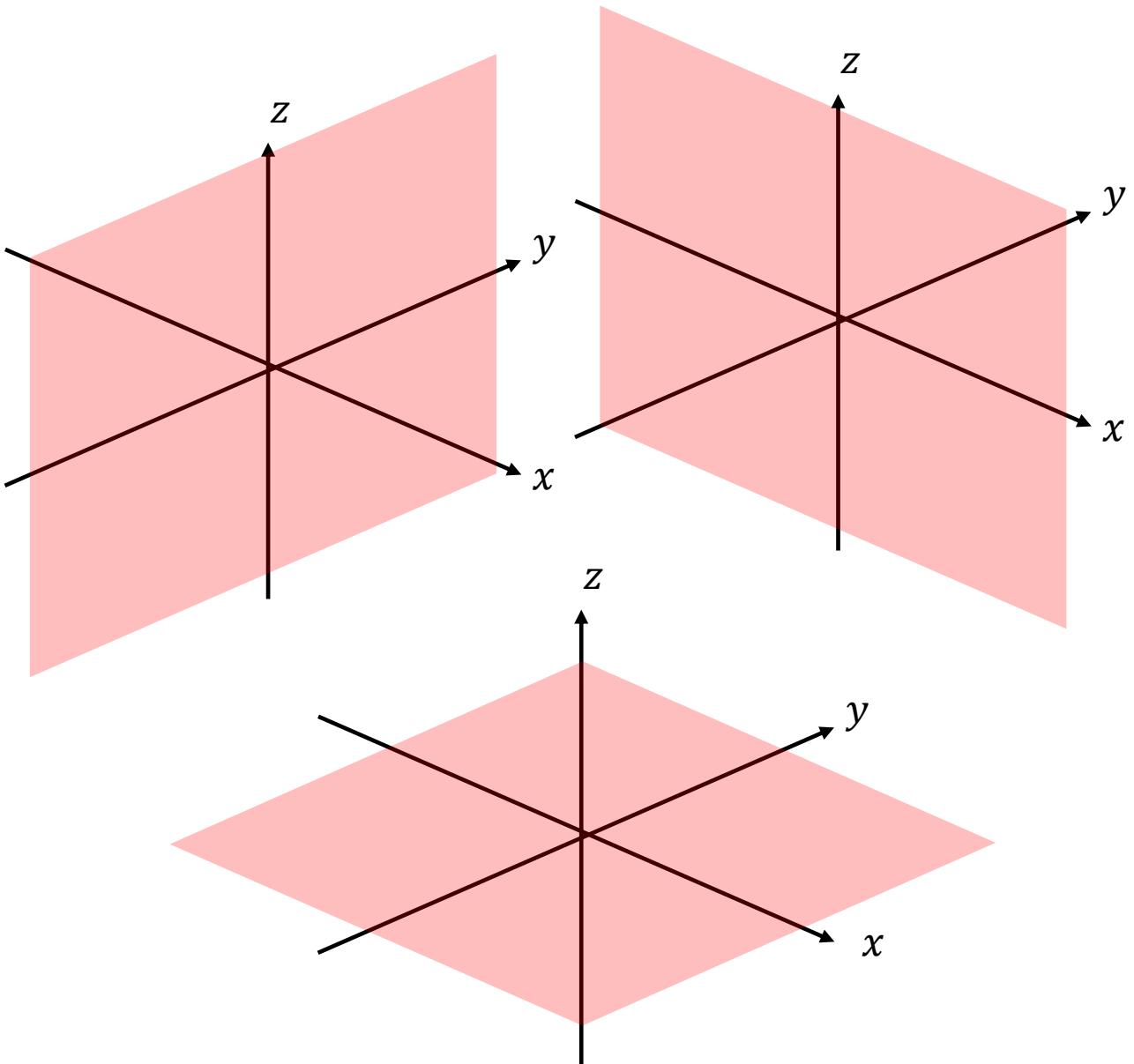


7E 3D Transformations



1. A transformation U , in three dimensions, represents a reflection in the plane $z = 0$.

a) Write down the 3×3 matrix that represents this transformation.

b) Find the image of the point $(-1, 2, 3)$ under this transformation

Reflection in the yz plane ($x = 0$)

Reflection in the xz plane ($y = 0$)

Reflection in the xy plane ($z = 0$)

2. A transformation U , in three dimensions, represents a 90° anticlockwise rotation around the x -axis
- a) Write down the 3×3 matrix that represents this transformation.

- b) Find the image of the point $(-1, 2, 3)$ under this transformation

Rotation anticlockwise θ around the x -axis

Rotation anticlockwise θ around the y -axis

Rotation anticlockwise θ around the z -axis

3. The matrix $\mathbf{M} = \begin{bmatrix} \frac{\sqrt{3}}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \\ -\frac{1}{2} & 0 & \frac{\sqrt{3}}{2} \end{bmatrix}$.

a) Describe the transformation represented by \mathbf{M} .

b) Find the image of the point with coordinates $(-1, -2, 1)$ under the transformation represented by \mathbf{M} .