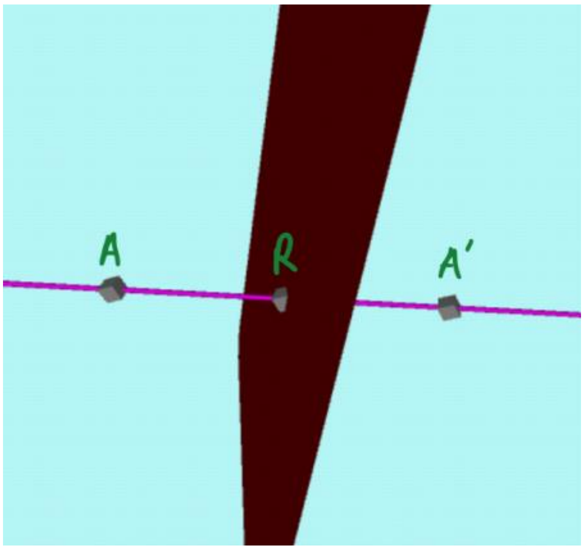


The point A (1, 3, 0) is on the line L, which is perpendicular to the plane $3x - 3\,y + 2z = 5$.

a. Find the equation of the line L.

b. Find the point R which is the intersection of the line L and the plane.

c. The point A is reflected in the plane. Find the coordinates of the image of A.

a)

normal $\boldsymbol{n} = \begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix}$

A (1, 3, 0) is on the line L

Equation of the line L $\boldsymbol{r} = \begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix}$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix}$$

b)

Parametric Equation of line

$$x = 1 + 3\lambda$$
$$y = 3 - 3\lambda$$
$$z = 2\lambda$$

Intersection with line and plane $3x - 3\,y + 2z = 5$

$$3(1 + 3\lambda) - 3\,(3 - 3\lambda) + 2(2\lambda) = 5$$

Solve for λ

$$3 + 9\lambda - 9 + 9\lambda + 4\lambda = 5$$

$$22\lambda = 11$$

$$\lambda = 0.5$$

Substitute into equation of line

$$x = 1 + 3(0.5)$$

$$y = 3 - 3(0.5)$$
$$z = 2(0.5)$$
$$\boldsymbol{R(2.5, 1.5, 1)}$$

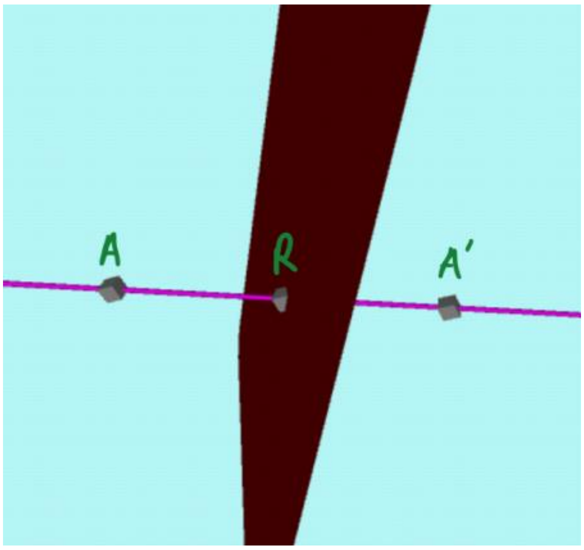
c)

The points A , R and A' lie on the straight line $\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix}$

$$\begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} + (0)\begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix} = \begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} + (0.5)\begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix} = \begin{pmatrix} 2.5 \\ 1.5 \\ 1 \end{pmatrix}$$

$$\begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} + (1)\begin{pmatrix} 3 \\ -3 \\ 2 \end{pmatrix} = \begin{pmatrix} 4 \\ 0 \\ 2 \end{pmatrix}$$



$$\boldsymbol{A'(4, 0, 2)}$$