CLASS-12
CHAPTER-11
THREE DIMENSIONAL GEOMETRY

Excercise 11.3

Q1. In each of the following cases, determine the direction cosines of the normal to the plane and the distance from the origin.

1. $z = 2$
2. $x + y + z = 1$
3. $2x + 3y – z = 5$
4. $5y + 8 = 0$

Solution:

1. From the given equation:

$$\mathbf{n} = \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}, c = 2 \tag{1}$$

The distance from the origin is given by:

$$d = \frac{|c|}{\|\mathbf{n}\|} = \frac{2}{1} = 2 \tag{2}$$

2. From the given equation:

$$\mathbf{n} = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}, c = 1 \tag{3}$$

The distance from the origin is given by:

$$d = \frac{|c|}{\|\mathbf{n}\|} = \frac{1}{\sqrt{3}} \tag{4}$$

3. From the given equation:

$$\mathbf{n} = \begin{pmatrix} 2 \\ 3 \\ -1 \end{pmatrix}, c = 5 \tag{5}$$

The distance from the origin is given by:

$$d = \frac{|c|}{\|\mathbf{n}\|} = \frac{5}{\sqrt{14}} \tag{6}$$

4. From the given equation:

$$\mathbf{n} = \begin{pmatrix} 0 \\ -5 \\ 0 \end{pmatrix}, c = 8 \tag{7}$$

The distance from the origin is given by:

$$d = \frac{|c|}{\|\mathbf{n}\|} = \frac{8}{5} \tag{8}$$