1.2 The Rectangular Coordinate System

To describe a vector accurately, some specific lengths, directions, angles, projections, or components must be given. There are three simple methods of doing this. Simplest of these is the rectangular, or rectangular cartesian, coordinate system.

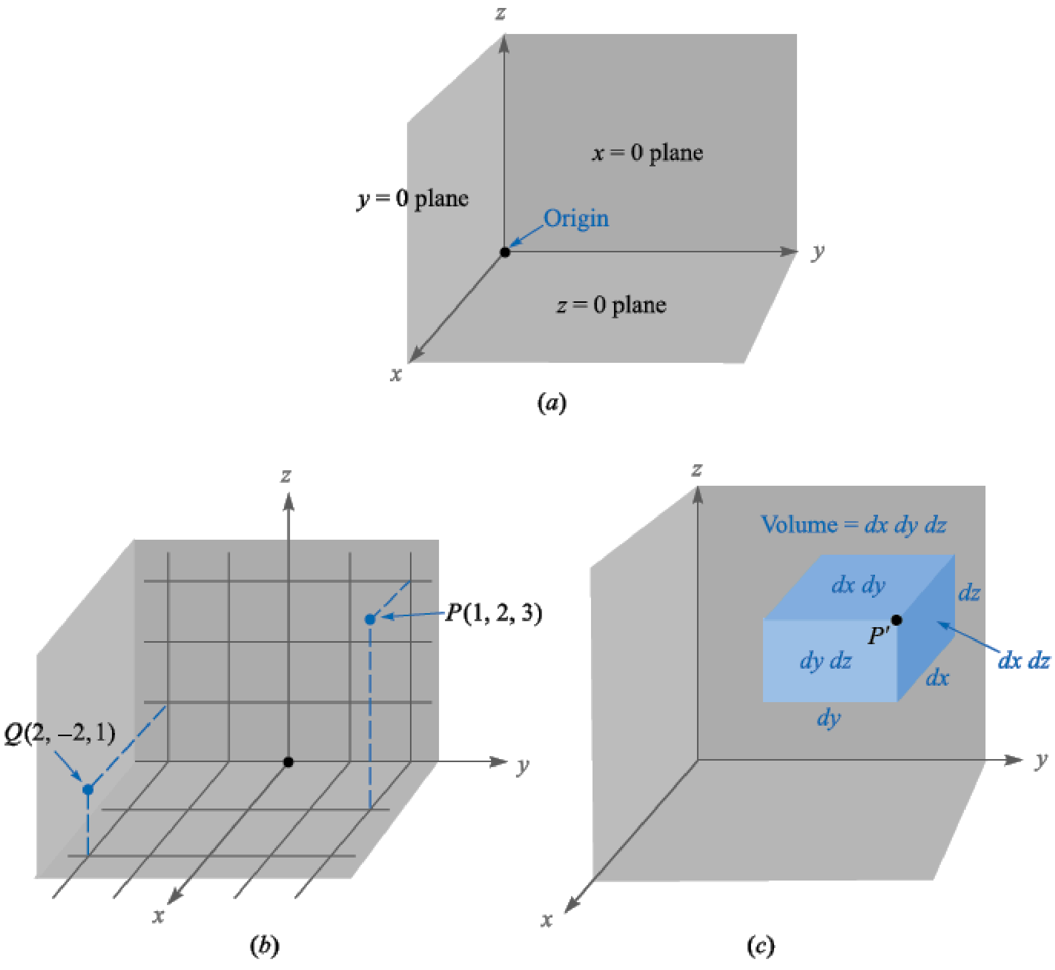

Fig. 1.3 Rectangular Coordinate System

(a) A right-handed rectangular coordinate system. If the curved fingers of the right hand indicate the direction through which the x axis is turned into coincidence with they axis, the thumb shows the direction of the z axis (Fig. 1.3(a)).

(b) The location of points P(1, 2, 3) and Q(2, -2, 1) (Fig. 1.3(b)).

(c) The differential volume element in rectangular coordinates; dx, dy, and dz are, in general, independent differentials (Fig. 1.3(c)).

Note: The point P is the common intersection of three surfaces. These are the planes x = constant, y = constant, and z = constant, where the constants are the coordinate values of the point. In other coordinate systems the points to be located at the common intersection of three surfaces, not necessarily planes, but still mutually perpendicular at the point of intersection (Fig. 1.4).

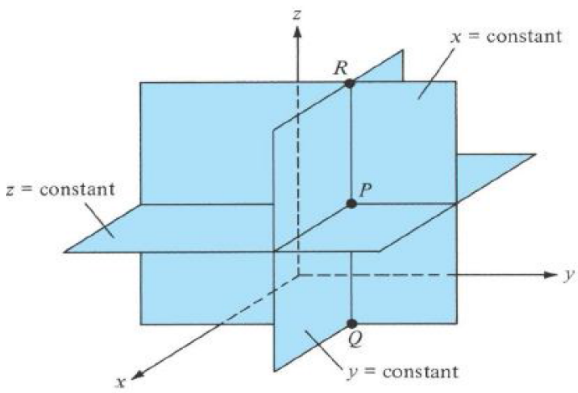

Fig. 1.4 A point P(x, y, z) in Cartesian co-ordinate system is represented as intersection of three planes x = constant, y = constant and z = constant