

1.3 Vector Components and Unit Vectors

Consider a vector $\mathbf{r} = \mathbf{x} + \mathbf{y} + \mathbf{z}$. It can be represented in terms of unit vectors as $\mathbf{r} = x\mathbf{a}_x + y\mathbf{a}_y + z\mathbf{a}_z$ (Fig. 1.5).

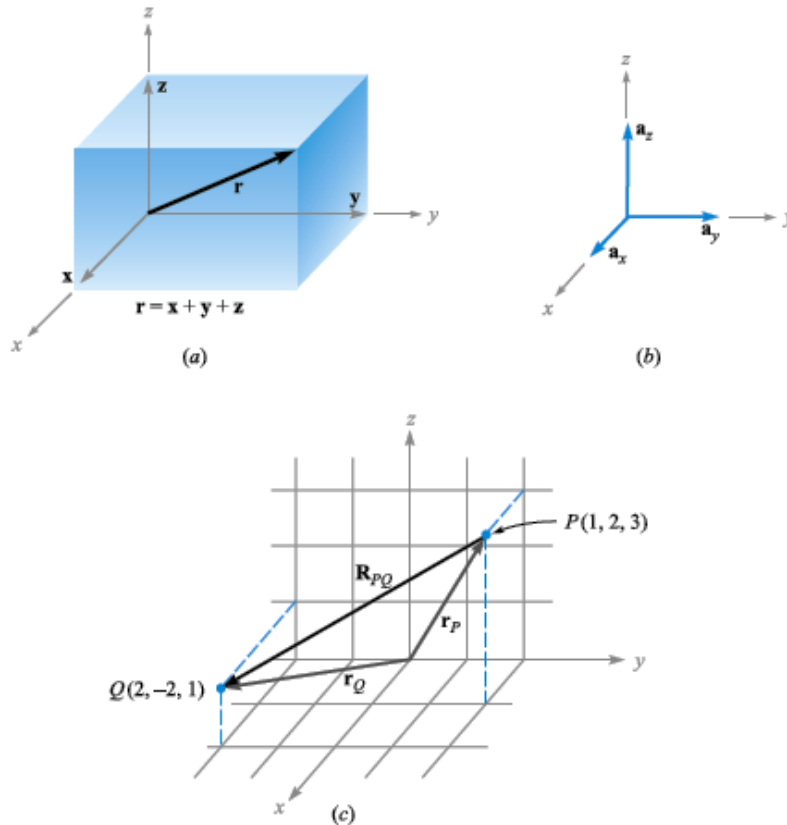


Fig. 1.5 (a) The component vectors x , y , and z of vector \mathbf{r} . (b) The unit vectors of the rectangular coordinate system have unit magnitude and are directed toward increasing values of their respective variables. (c) The vector \mathbf{R}_{PQ} is equal to the vector difference $\mathbf{r}_Q - \mathbf{r}_P$.

Unit vector Consider a vector, $\mathbf{r} = \mathbf{x} + \mathbf{y} + \mathbf{z}$, the unit vector is given as, $\hat{r} = \frac{\mathbf{r}}{r}$, where, $r = \sqrt{x^2 + y^2 + z^2}$