

## Exercise 29

*In Exercises 29 to 31, use vector methods to describe the given configurations.*

The parallelepiped with edges the vectors  $\mathbf{a}$ ,  $\mathbf{b}$ , and  $\mathbf{c}$  emanating from the origin

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### Solution

Assuming that the vectors,  $\mathbf{a}$ ,  $\mathbf{b}$ , and  $\mathbf{c}$ , are linearly independent, the entire three-dimensional space is spanned by taking a linear combination of these three.

$$\mathbf{r}(s, t, u) = s\mathbf{a} + t\mathbf{b} + u\mathbf{c}$$

By restricting  $s$ ,  $t$ , and  $u$  to be between 0 and 1, only points within the parallelepiped with edge vectors,  $\mathbf{a}$ ,  $\mathbf{b}$ , and  $\mathbf{c}$ , are obtained.

$$\{s\mathbf{a} + t\mathbf{b} + u\mathbf{c}, 0 \leq s \leq 1, 0 \leq t \leq 1, 0 \leq u \leq 1\}$$