Exercise 24

Find the points of intersection of the line $x = 3 + 2t$, $y = 7 + 8t$, $z = -2 + t$, that is, $\mathbf{l}(t) = (3 + 2t, 7 + 8t, -2 + t)$, with the coordinate planes.

Solution

Set $t = -3/2$ to get the line's intersection with the yz-plane.

$$\mathbf{l}\left(-\frac{3}{2}\right) = \left(0, -5, -\frac{7}{2}\right)$$

Set $t = -7/8$ to get the line's intersection with the xz-plane.

$$\mathbf{l}\left(-\frac{7}{8}\right) = \left(\frac{5}{4}, 0, -\frac{23}{8}\right)$$

Set $t = 2$ to get the line's intersection with the xy-plane.

$$\mathbf{l}(2) = (7, 23, 0)$$