12.5, number 15: **Give parametric equations for the line segment from $P = (1, 0, 0)$ to $Q = (1, 1, 0)$. Please draw a picture.**

Answer: There is a picture on the next page.

Walk along the line segment so that at time $t = 0$ you stand at P and at time $t = 1$ you stand at Q.

The vector equation

$$\overrightarrow{P(x, y, z)} = t\overrightarrow{PQ}$$

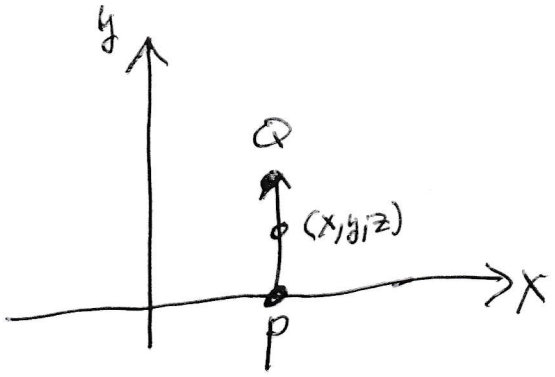
gives you the itinerary from the previous sentence. In other words,

$$(x - 1)\,\vec{\boldsymbol{i}} + y\,\vec{\boldsymbol{j}} + z\,\vec{\boldsymbol{k}} = t(0\,\vec{\boldsymbol{i}} + \vec{\boldsymbol{j}} + 0\,\vec{\boldsymbol{k}})$$

$$\boxed{\begin{cases} x = 1 & \\ y = t & \text{for } 0 \le t \le 1 \\ z = 0, & \end{cases}}$$

gives the line segment from P to Q starting at P at time 0 and ending at Q at time 1. (The back of the book starts on P at time -1 and ends at Q at time 0. The statement of the problem does not give any instructions about the starting and stopping time, so either of these answers (and many others) are fine.)

Picture for 12.5 Number 15



If an object moves according to

$$\begin{cases} X = 1 \\ Y = t \\ Z = 0 \end{cases}, \quad 0 \le t \le 1$$

then at time 0 the object stands on P
and at time 1 the object stands on Q