Answer on Question #76994 – Math – Linear Algebra

Question

x = u + t1v + t2w

What conditions on the vectors u, v, w ∈ R3, would create an object that is not a plane?

Solution

The expression x=u+t1*v+t2*w sets a plane in R3 only if: 1) u the radius-vector of a point; 2) v, w are (nonzero) linear independent (not collinear) vectors.

If u is the radius-vector of some point, then x=u+t1*v+t2*w is not plane only if vectors v and w are linearly dependent (v and w are collinear).

Vectors $v, w \in \mathbb{R}^3$ must be linearly dependent. It means that
$\exists\, a_1, a_2 \in \mathbb{R}\,(a_1 \neq 0 \text{ or } a_2 \neq 0)$: $a_1 v + a_2 w = 0$.