Step-1

As referred, if P is a plane in $\mathbf{R}^3$, then it is spanned by 2 linearly independent vectors.

So, its orthogonal complement must be a vector space with dimension 3 â€“ 2 = 1

That is the orthogonal complement of P must be a line L but not another plane.

Step-2

In view of this discussion, if **V** is a subspace of $\mathbf{R}^n$ with dimension p, and **W** is a subspace of $\mathbf{R}^n$ with dimension q, then it follows that there is necessarily a non zero vector in the intersection of **V** and **W** is $p + q > n$

Step-3

We know that the zero vector is a vector whose length is 0 and assumes the direction to which it is added or subtracted.

We know that **V** and **W** are the subspaces orthogonal if and only if their intersection is the zero vector alone.

But when $p + q > n$, we have a non zero vector in the intersection of **V** and **W**.

Therefore, **V** and **W** cannot be orthogonal.

Step-4

We also follow that $p + q < n$ also cannot guarantee that **V** and **W** are orthogonal.