Step-1

(b)

Consider the line passing through $(1,1,1)$ and the plane through $(1,0,0)$ and $(0,1,1)$. Both these subspaces pass through the origin and therefore,

$\boxed{\{0\}}$ is clearly in their intersection.

Further note that the vectors $(1,0,0)$ and $(0,1,1)$ belong to the plane, therefore, their addition also belongs to the plane.

But $(1,0,0)+(0,1,1)=(1,1,1)$, which is along the straight line, passing through $(1,1,1)$.

Therefore, the line is contained in the plane.

Thus, the intersection of the plane and the line is the $\boxed{\text{line itself}}$.

Step-2

Since the line is contained in the plane itself, adding a vector to any of the vector in the plane will produce a vector in the plane only.

Thus, sum of the two subspaces is the $\boxed{\text{plane itself}}$, which passes through $(1,0,0)$ and $(0,1,1)$.

Step-3

(c)

Consider the two subspaces $\{0\}$ and $\mathbf{R}^3$ of the vector space $\mathbf{R}^3$.

It is clear that their intersection is the subspace $\boxed{\{0\}}$ and their addition is the entire $\boxed{\mathbf{R}^3}$.

Step-4

(d)

Consider two subspaces of $\mathbf{R}^3$, one is a plane perpendicular to the vector $(1,1,0)$ and the plane, perpendicular to $(0,1,1)$.

Since both the planes are subspaces, these must pass through the origin $(0,0,0)$.

The equation of the plane, perpendicular to $(1,1,0)$ is $x-y=0$.

That is $x=y$. The equation of the plane, perpendicular to $(0,1,1)$ is $y-z=0$.

That is $y = z$.

Their intersection is the $\boxed{\text{straight line, which passes through the origin and passes through all those points, for which } x = z}$ It is clear that the sum of these two subspaces is the complete vector space $\boxed{\mathbf{R}^3}$.