Solutions for Class Quiz on 1/28

Is $W = \{\begin{pmatrix} a & b \\ c & a+b \end{pmatrix} | b + c = 1\}$ **a subspace of** $M_{2,2}$**?**
(If yes, show it. If no, why not?)

Answer: No. W is not closed under vector addition. Let $a = 0, b = 0, c = 1$ then: $A = \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}$ has $b + c = 1$. So A is in W. Consider $A + A = \begin{pmatrix} 0 & 0 \\ 2 & 0 \end{pmatrix}$. It has $b + c = 2$, so $A + A$ is not in W.

There are many examples of why W is not a subspace. It also does not contain the zero 2 x 2 matrix, for example.