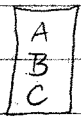
Axiom 1 – There exist exactly 3 points.
2 – Every pair of points is on exactly one line.
3 – Every pair of lines is on at least one point.
4 – No 3 points are collinear.

b.) Is the system independent? (Negate one axiom at a time.)

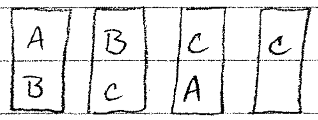
Negates #4



Model 1

For a system to be independent, each axiom must be independent. This means that a given axiom in a system cannot be derived from the other axioms in the system. To show this I used models that negated one axiom at a time (but allowed the remaining axioms to stand true). In the models, lines are represented by boxes, and points are represented by letters.

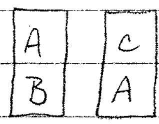
Negates #3



Model 2

In M1 there are exactly 3 points, and every pair of points, AB + BC, are on one line. This satisfies A1 + A2, and A3 is true "by default" since it cannot be contradicted. But A4 is negated since the line has 3 collinear points. In model 2, there are only 3 points, every pair of points is on exactly one line, and no 3 points are one one line. But lines AB and C do not share a point, so A3 is negated.

Negates 2

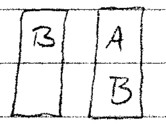


Model 3

In M3, only 3 points exist, every pair of lines shares a point, and no 3 points are in a line (satisfying axioms 1,3+4). But the pair BC is not on a line, so A2 is negated.

In M4, no 3 points are collinear, the pair of lines have one point in common, and the pair of points is on only one line. These Axioms (2,3,4) could even be satisfied by the model $\boxed{\begin{matrix}A\\B\end{matrix}}$. But model 4 does not satisfy axiom 1.

Negates 1



Model 4

Consequently, the axiom system is independent since each of the axioms in the system cannot be derived from the other axioms, as is shown in these models.

I struggled with this problem, because when I read axioms that state "every pair of...." I want to assume that there does exist a pair then, but this is not neccessarily true.

Good.