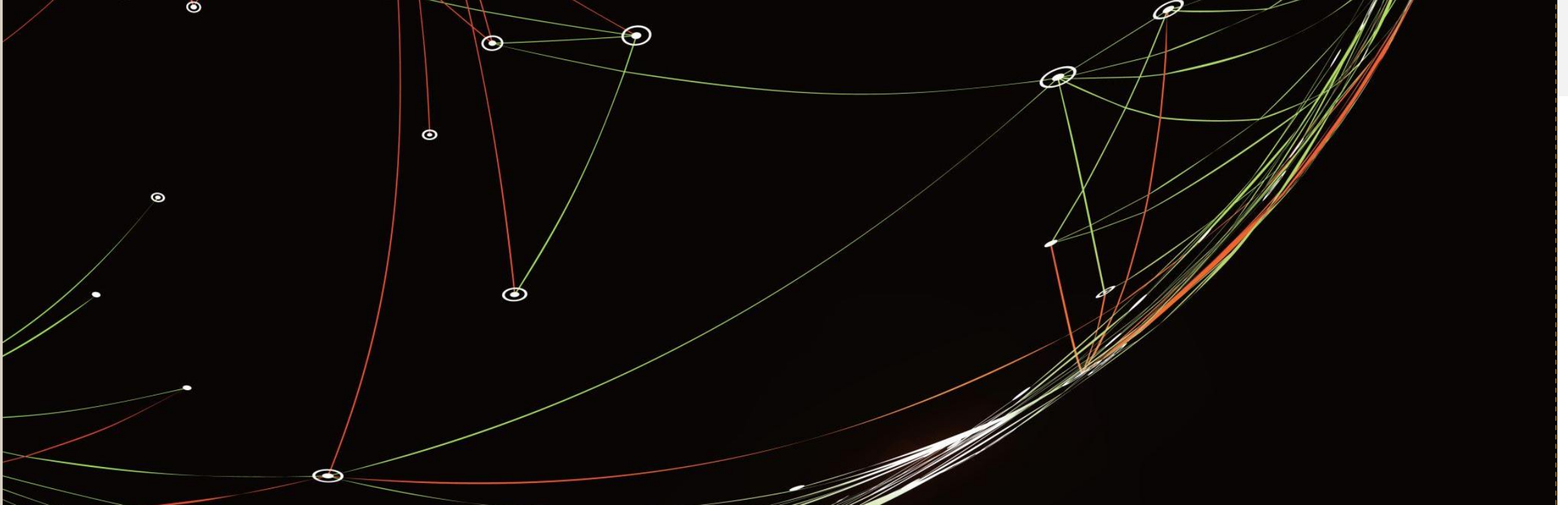
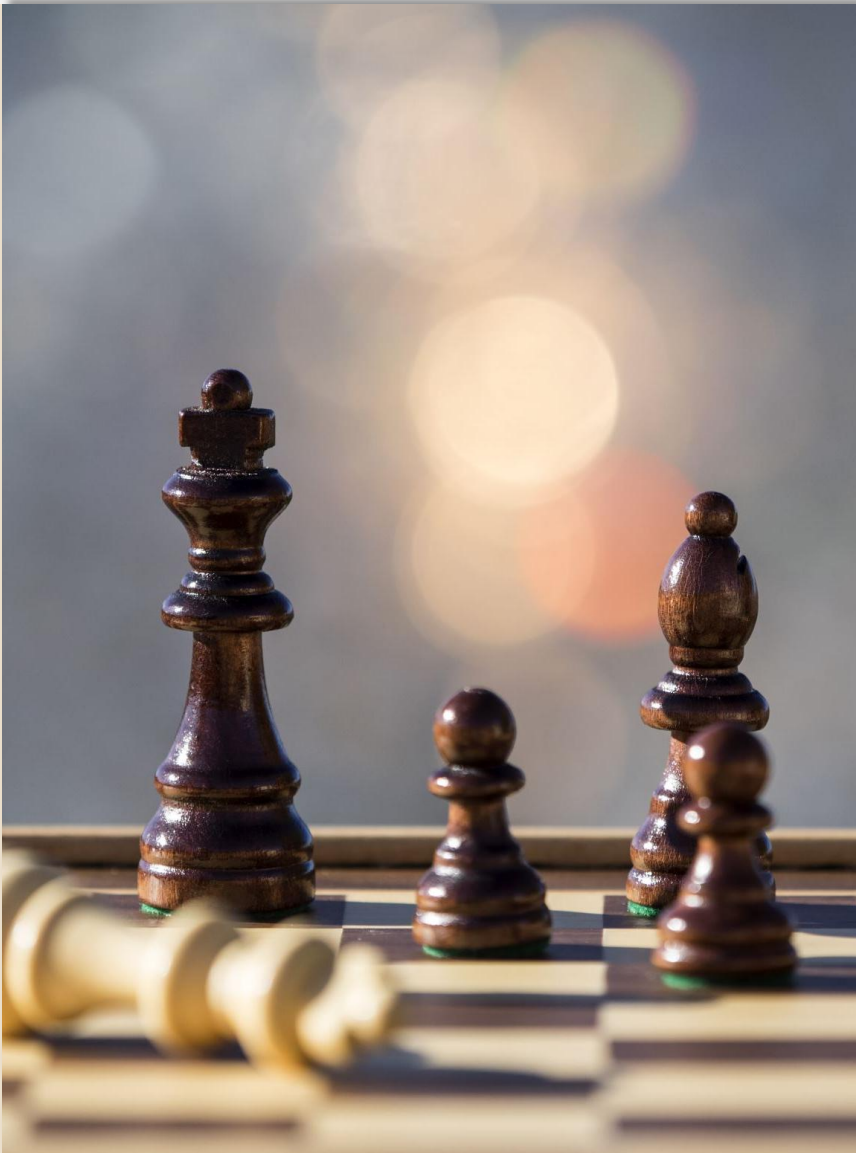




My Axiom System

King's College

Tony Favata



What is an axiom System?

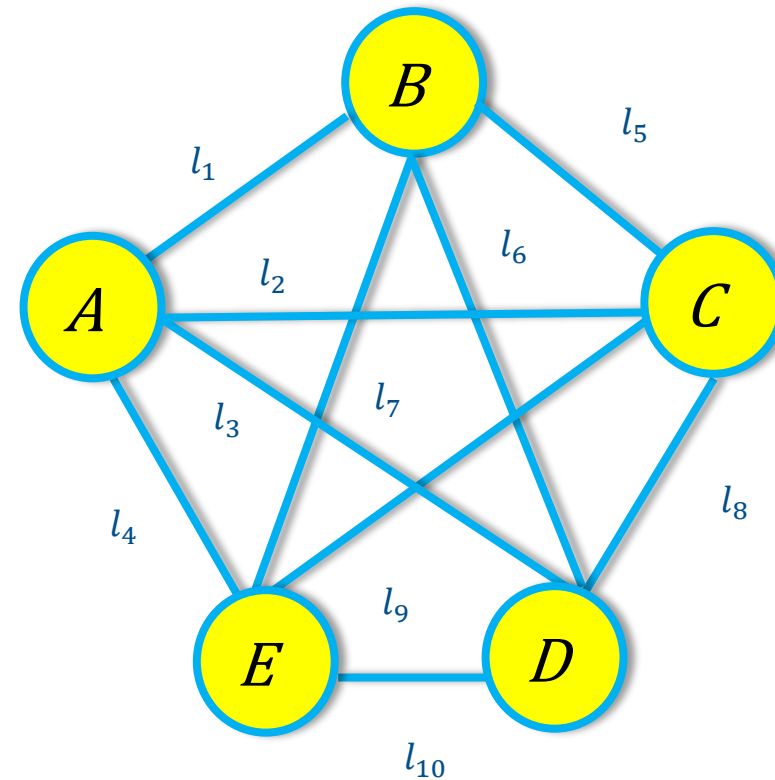
- ♦ An Axiom system uses primitive terms and formally stated assumptions taken as true along with theorems and proofs.
- ♦ An Axiom system is like a set of basic rules in a game that everyone agrees are true before playing. For example, the game of Chess forces each unique piece to move in a certain direction / pattern.

My Axiom System

- ♦ Primitive Terms:
 - ♦ Point, line, and bind (*binded*)
- ♦ [A1]: Each point binds at least four lines
- ♦ [A2]: Any two points are binded by exactly one common line
- ♦ [A3]: No three points are binded by a common line
- ♦ [A4]: There are at least four points

Consistency Model

- [A1]: Each point binds at least four lines
- [A2]: Any two points are binded by exactly one common line
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- [A4]: There exist at least four points

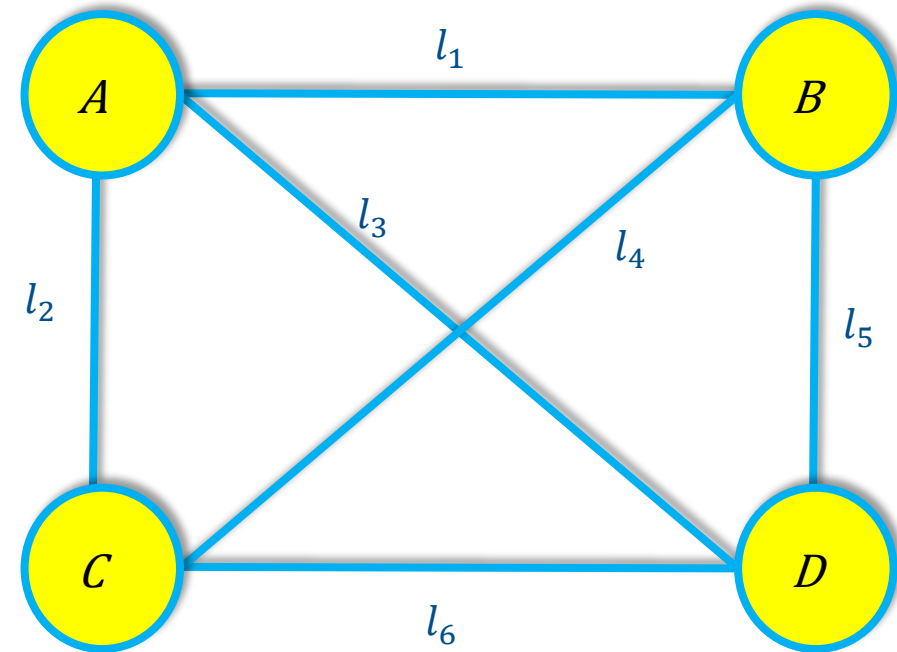


Independence Models

- ♦ An Independence Model is a construction that excludes one of the axioms. The model shows the excluded axiom isn't dependent on the other axioms.
- ♦ In the game of chess if we change a rule, say pawns can now move backwards, the remaining rules don't change based on the first alteration.

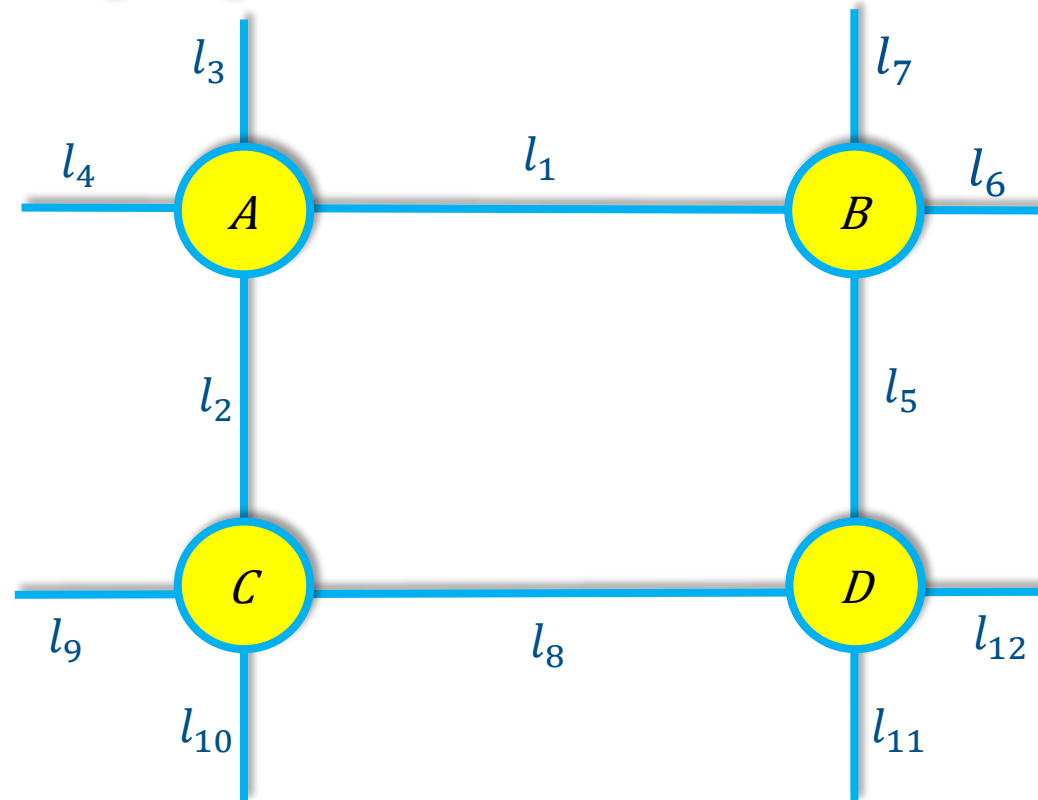
Independence Models

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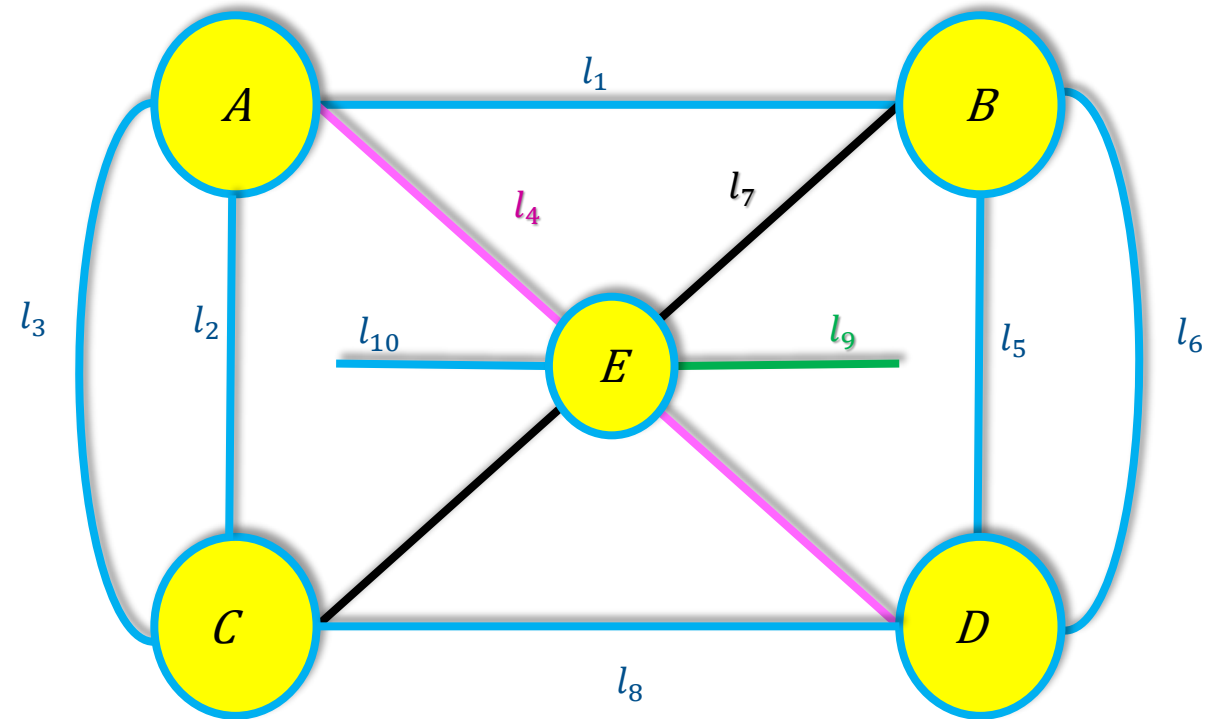
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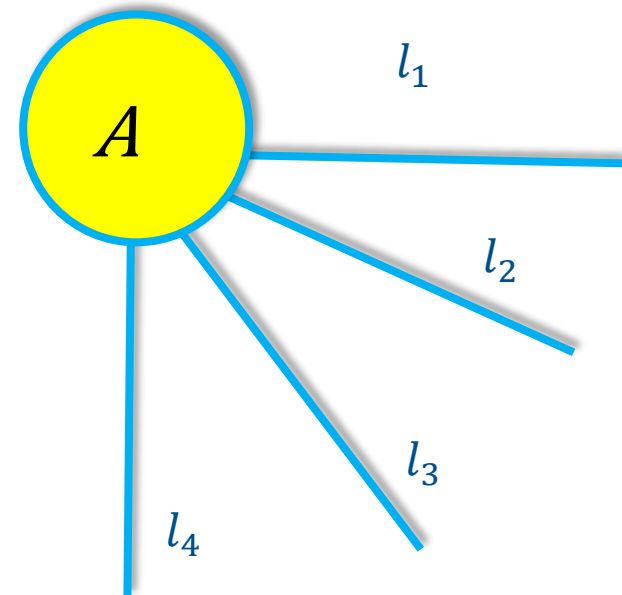
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Theorems of my Axiom System

- Theorem 1: For exactly five points, there are at least 10 lines
- Theorem 2: If each point is binded by exactly four lines, and each line requires two binded points, then there must be at least five points.
- Theorem 3: Each point binds a distinct common line with at least three other points

Theorems of my Axiom System

We'll prove
these ones!

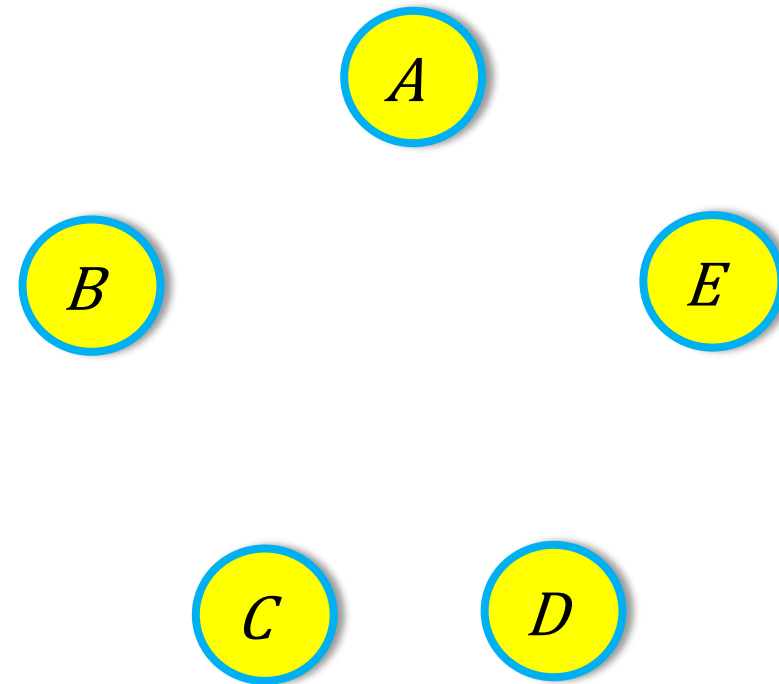
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Theorem 1

For exactly 5 points, there are at least 10 lines

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By our hypotheses, there are exactly 5 points. Call them, A , B , C , D , and E

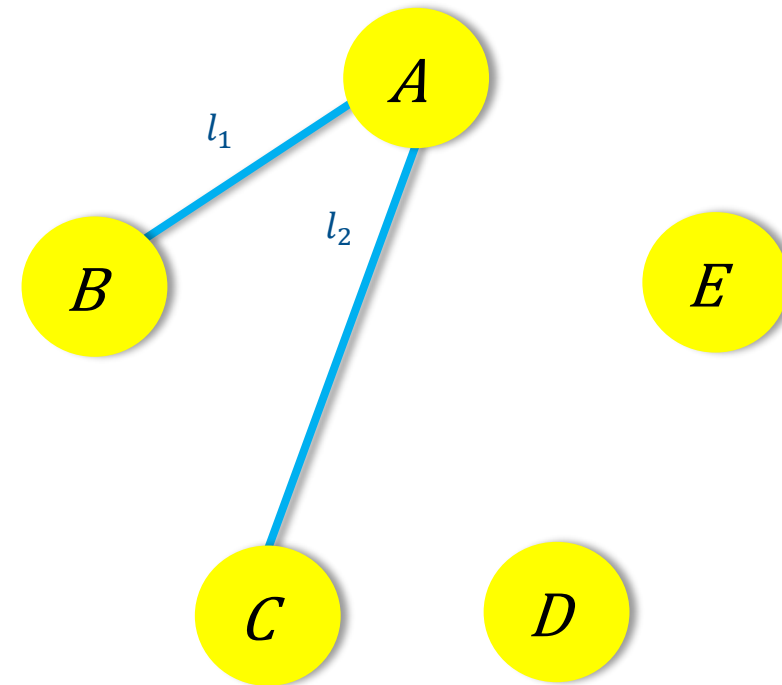


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By [A2], we can bind points A and B are binded by l_1 . Then l_2 binds points A and C

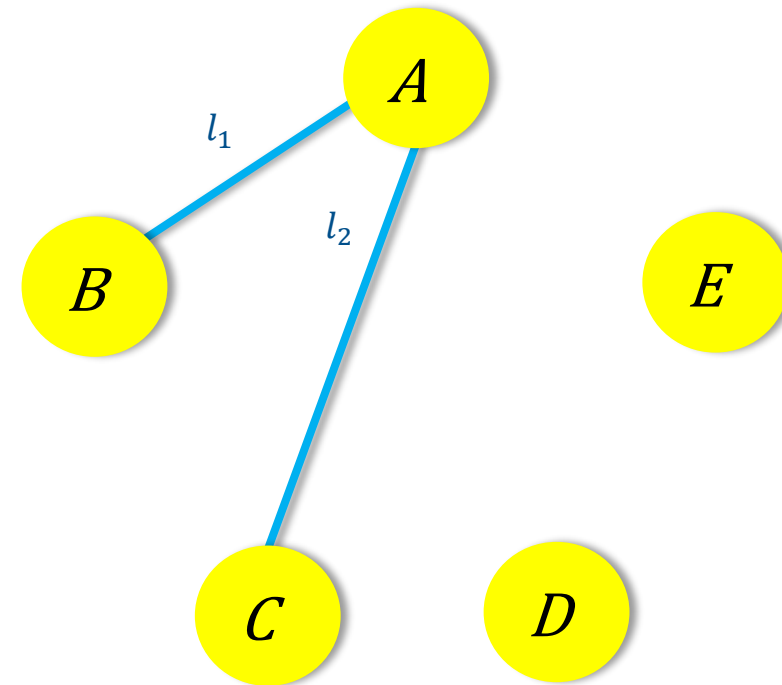


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Before we can move forward, [A3] prevents l_1 and l_2 from being the same line.

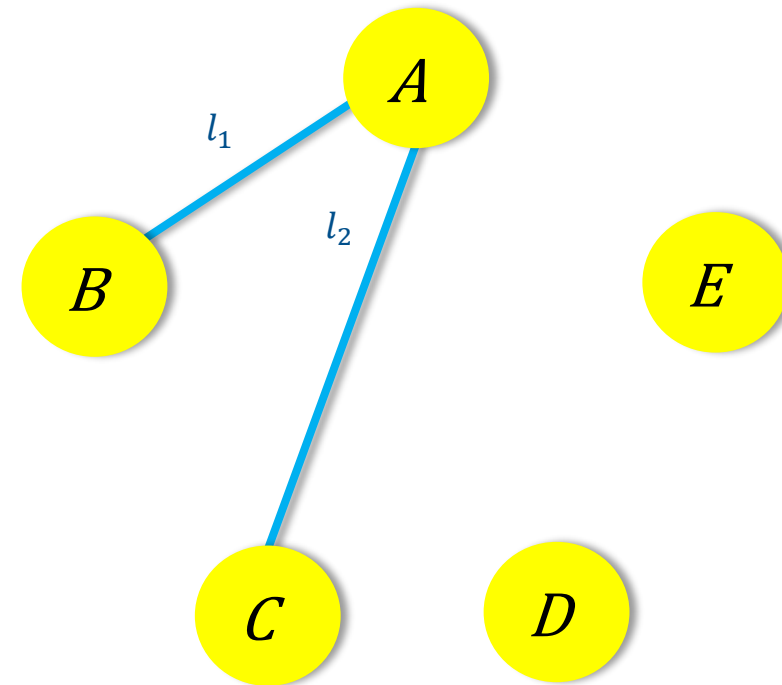


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If l_1 and l_2 were the same line, [A3] would be violated since three points would fall on one common line

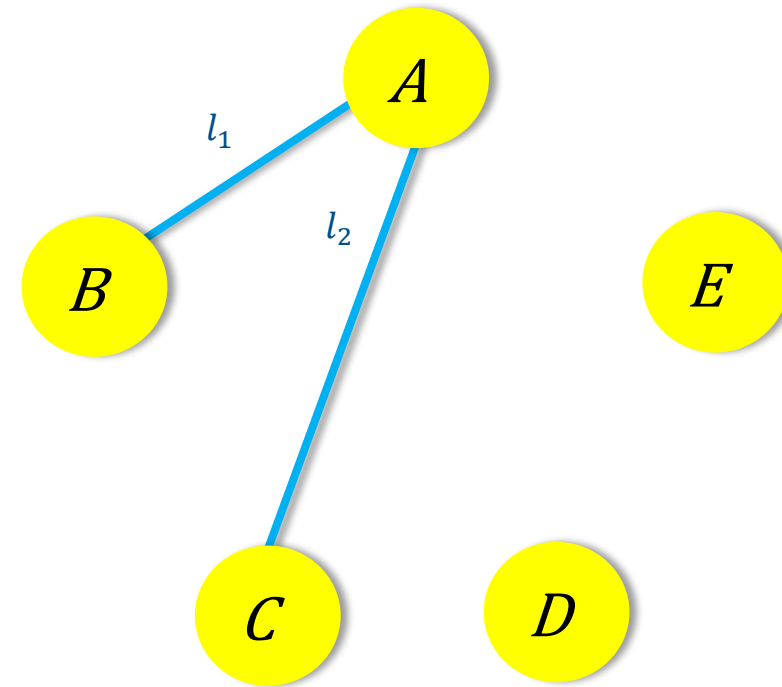


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Without Loss of generality (WLOG), each line created must be unique and distinct.

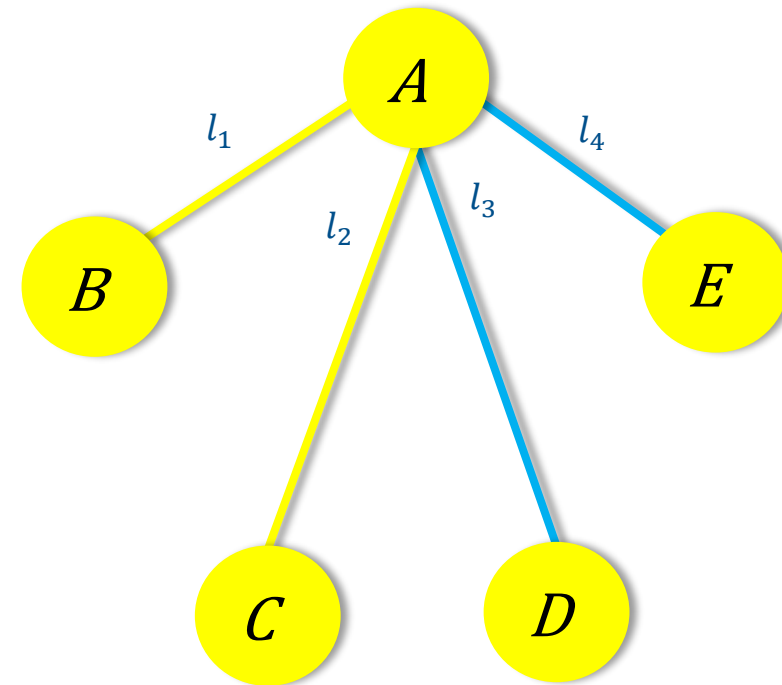


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Therefore, l_3 binds points A and D , then l_4 binds A and E .

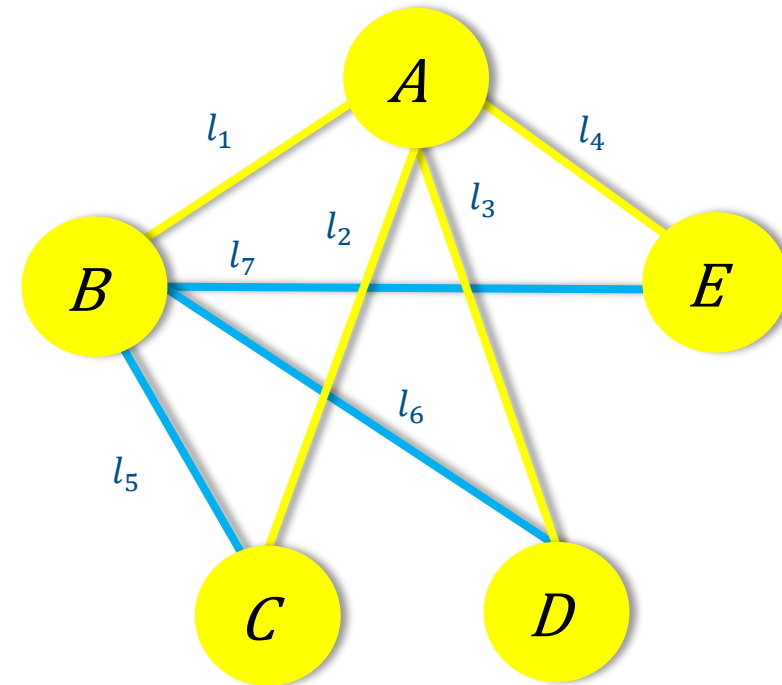


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Moving on, points B and C are binded by l_5 ; then B and D binded by l_6 . B and E binded by l_7 to finish.

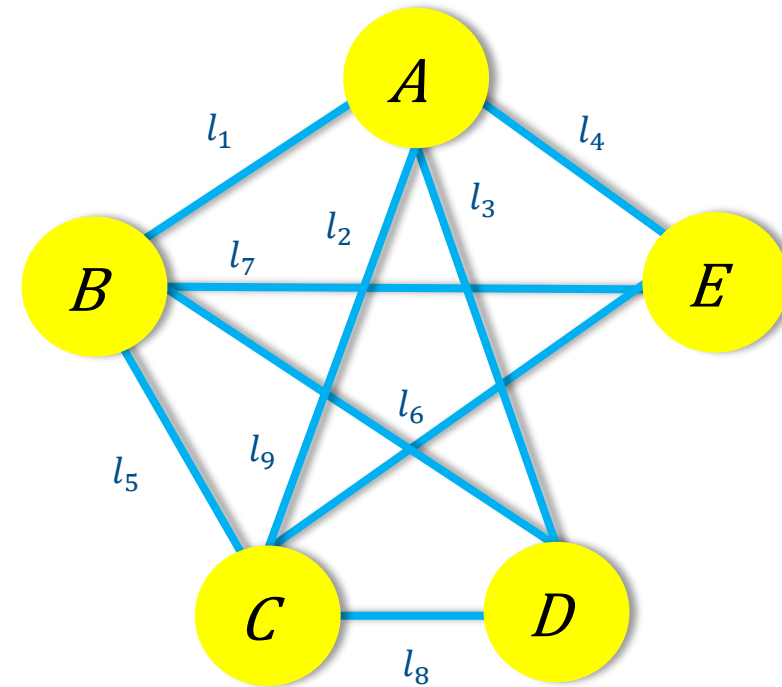


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Finishing up here, points C and D binded by l_8 , then l_9 binding C and E .

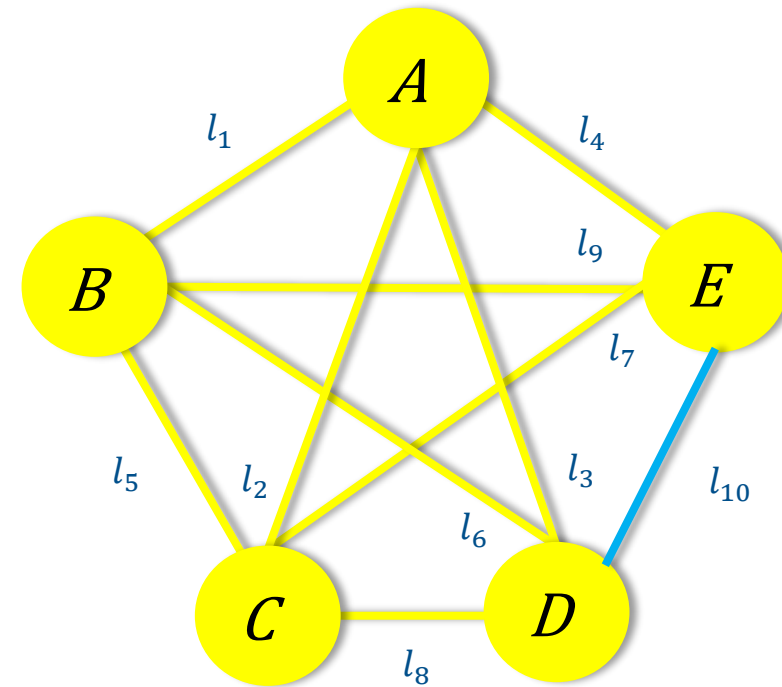


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Finally, points D and E are binded by our last possible line, l_{10} .

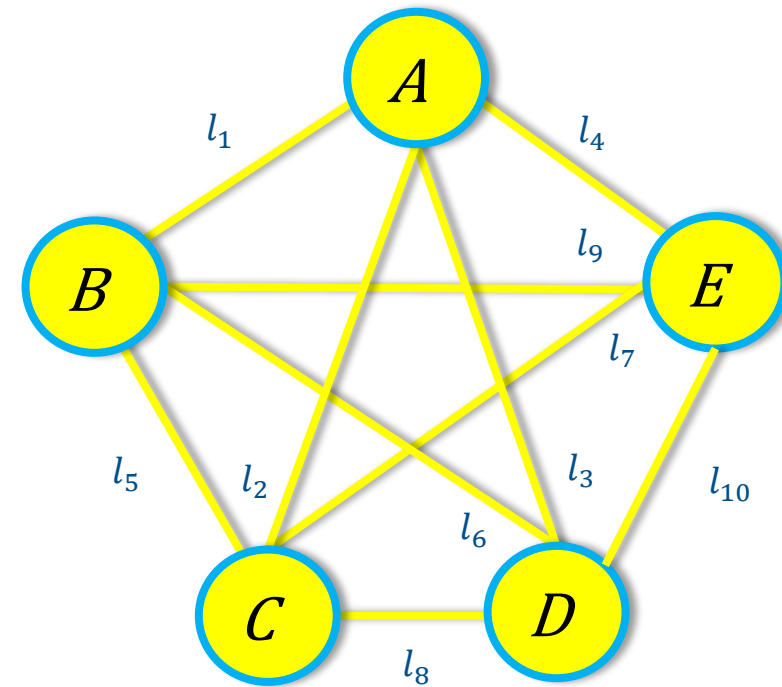


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Since each point as 4 lines attached, [A1] is satisfied. We have also met the minimum number of lines to satisfy this theorem.



Theorems of my Axiom System

We'll prove
these ones!

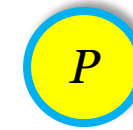
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Each point binds a distinct common line with at least three other points

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Let there be an arbitrary point P

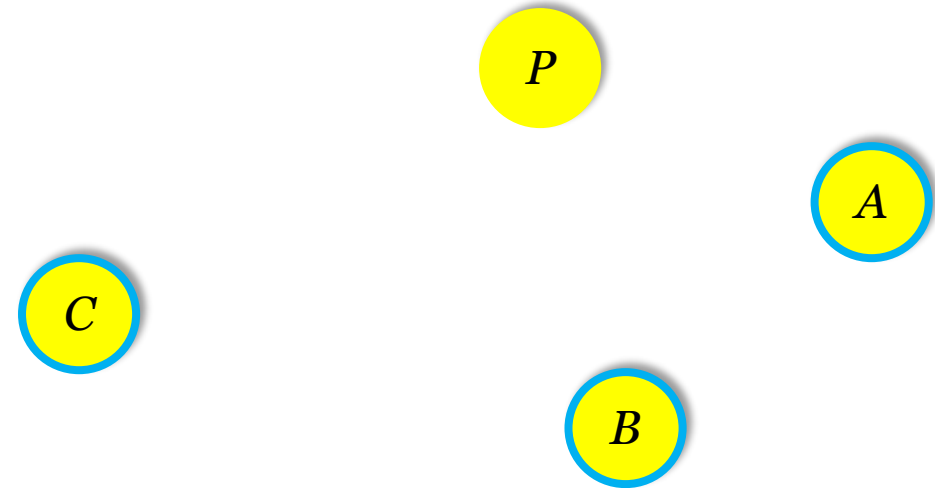


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By [A4], there exist at least three more points; call them A , B , and C

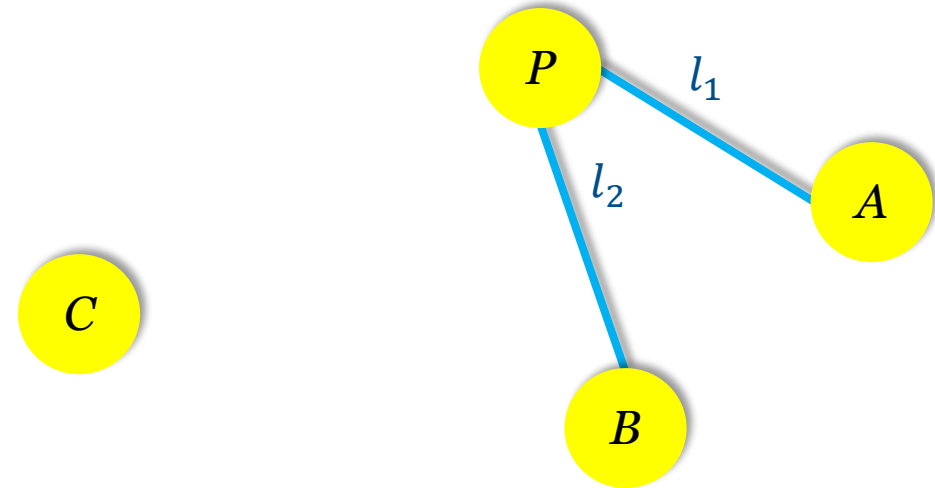


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By [A2] P and A bind a common line, call it l_1 , then P and B bind a common line called l_2

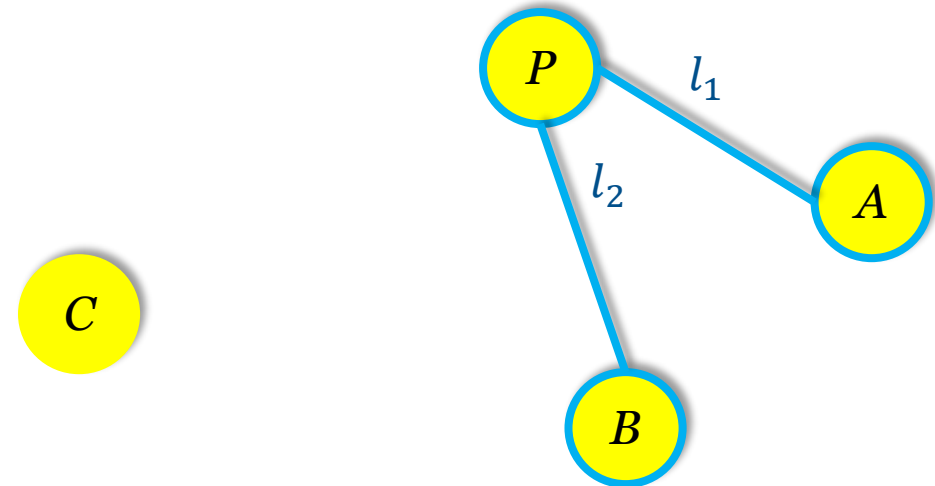


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[A3] prevents three points being binded to a common line. Therefore l_1 and l_2 cannot be the same line

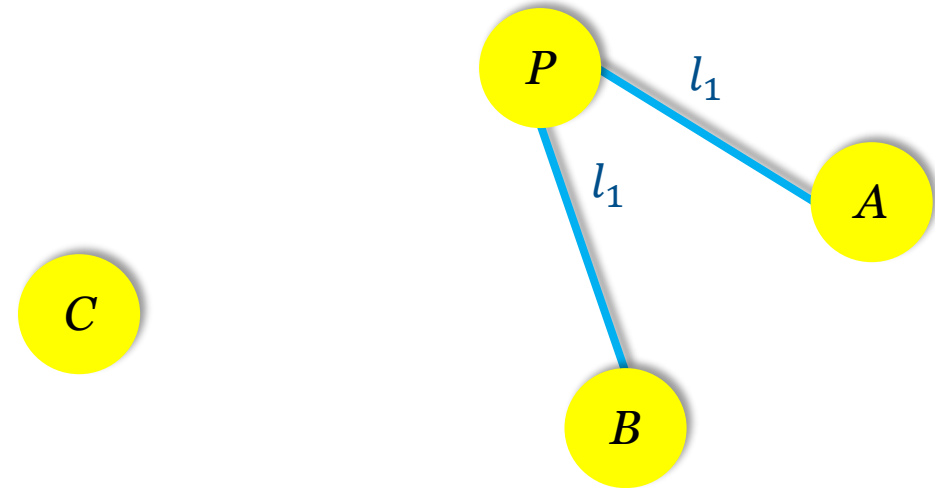


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If l_1 and l_2 were the same line, each line would have the three points onto that line, Violating [A3].

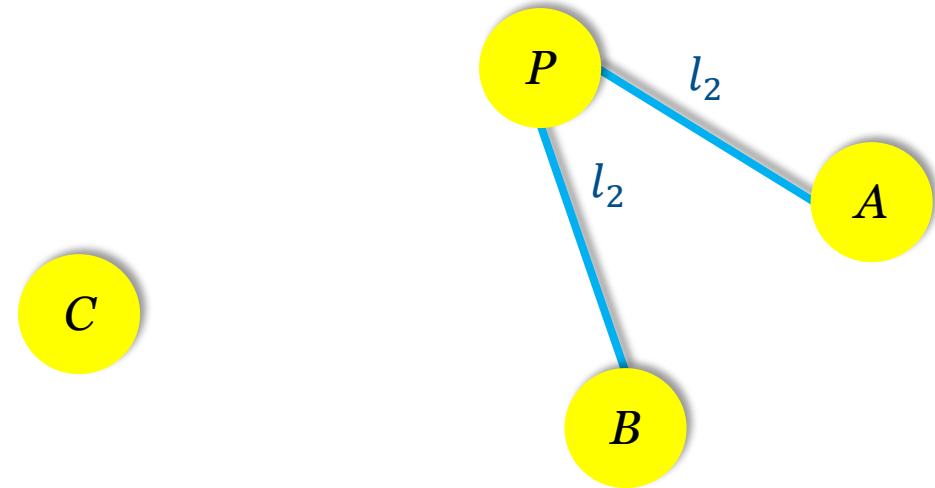


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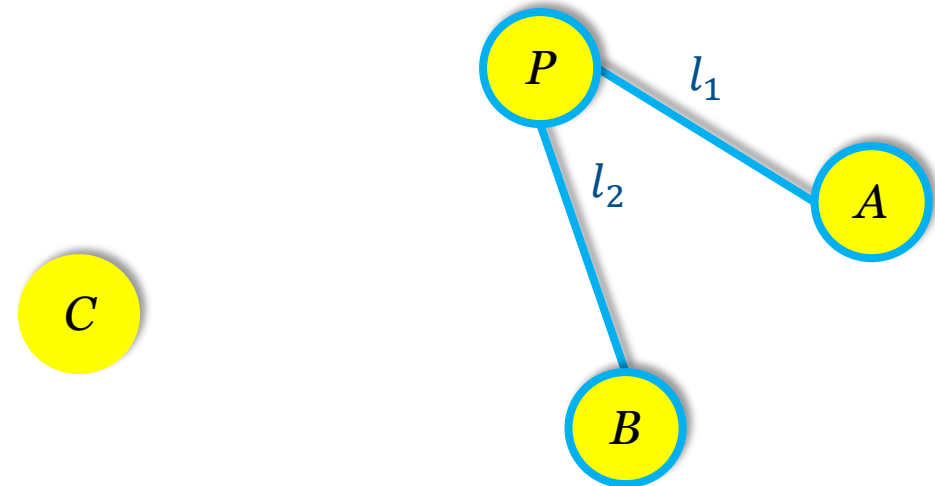


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Here we can conclude that [A3] prevents l_1 and l_2 being the same line.

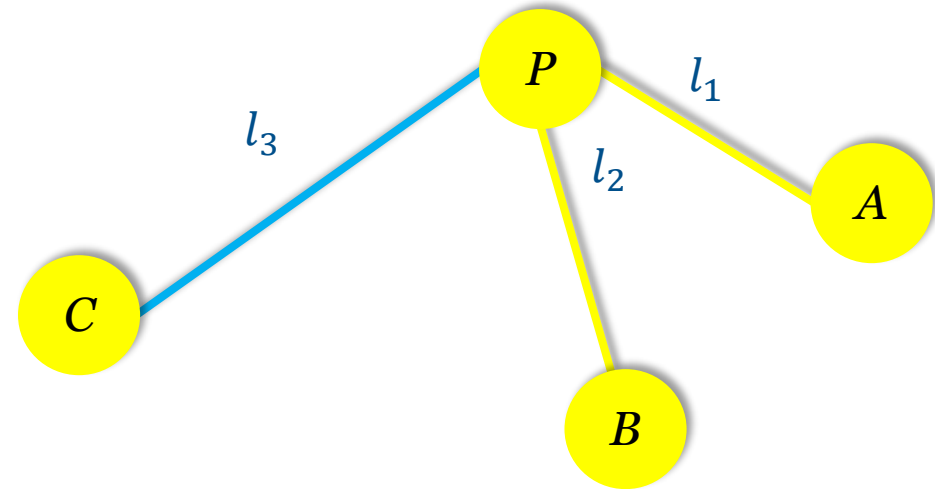


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Points P and C can also be binded by a common line; call it l_3 .

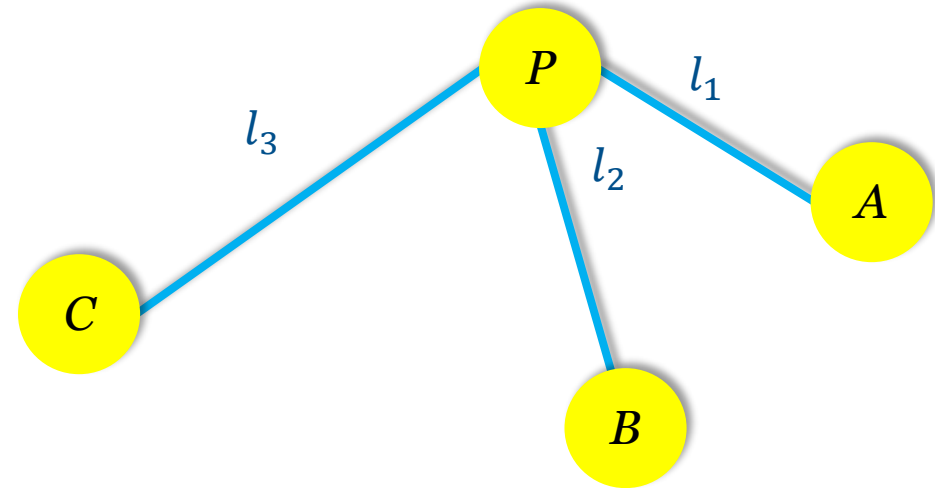


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Once again, we can say that $l_1 \neq l_3$ and $l_3 \neq l_2$.

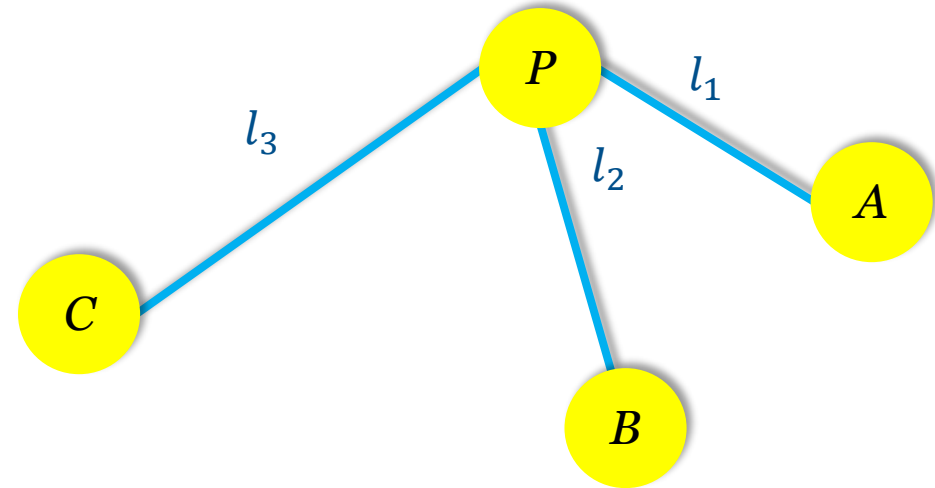


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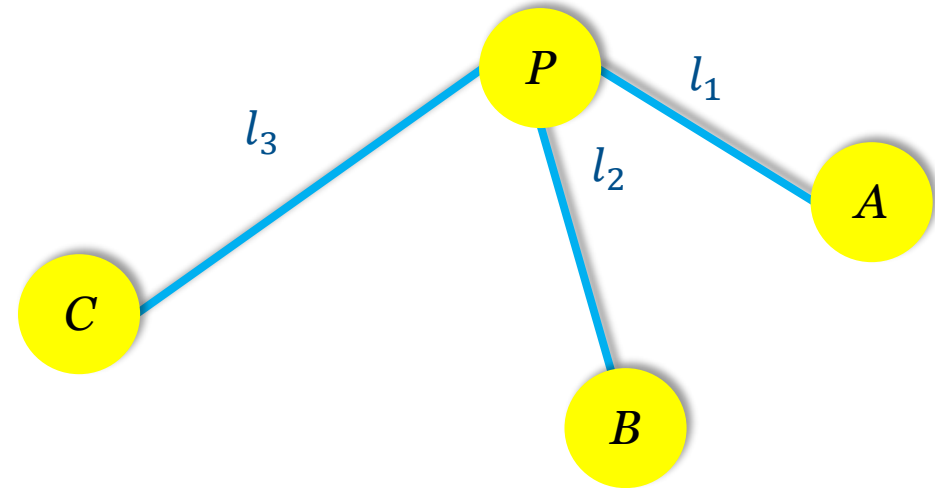
Without loss of generality (WLOG),
Each line created is distinct and unique

Theorem 3

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Since we are talking about our arbitrary point P . The points A , B , and C are created to help prove the point P .

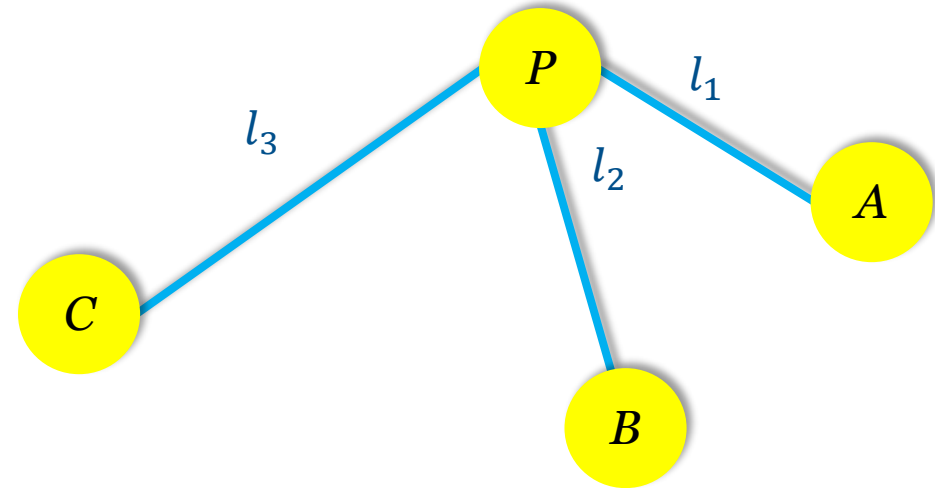


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Since the hypothesis is satisfied by the point P , we have finished our proof for theorem 1.



Questions, comments, or concerns are encouraged

Thank you!