Wed Sept 9, 2015

Leftover from Ch 2: Justify steps in proof of Incidence Geometry Theorem 5

In Incidence geometry, for every point P, there exist at least two lines that pass through P.

Question:
What's wrong with this proof of theorem 5?

Proof
1) There exist 3 non-collinear points (by Thm 2)
   Call them P, B, C
2) Lines \( \overleftrightarrow{PB} \), \( \overleftrightarrow{PC} \) exist (by axiom 4 2)
3) These lines are not the same line (because P, B, C are non-collinear by statement (2))
4) Conclude that there exist at least two lines that pass through P

End of proof
Chapter 3 Neutral Geometry

Goal for the course

Section 3.1 Neutral Geometry

Ten axioms $\langle N1 \rangle - \langle N10 \rangle$

These describe much of the behavior of our usual "straight line" geometric drawings and the analytic geometry of the $x$-$y$ plane.
We will study Neutral Geometry for many weeks. But we will see that the Neutral Geometry axioms are not quite complete.

Groups of Axioms in Neutral Geometry

First Group

Axioms of Incidence + Distinctness

\( \langle N_1 \rangle \)  
\( \langle N_2 \rangle \)  
\( \langle N_3 \rangle \)  

Exactly same as the Incidence geometry first three axioms \( \langle I_1 \rangle, \langle I_2 \rangle, \langle I_3 \rangle \)

\( \langle N_4 \rangle \)  
these specify that there must be an infinite

\( \langle N_5 \rangle \)  
set of points on each line (and other behavior is specified as well).
Observe: any statement that could be proven using Incidence Axioms \(\langle I_1\rangle, \langle I_2\rangle, \langle I_3\rangle\) could be proven using Neutral Geometry axioms \(\langle N_1\rangle, \langle N_2\rangle, \langle N_3\rangle\).

Neutral Geom Theorems 1 - 5 are just old Incidence Geometry theorems.

[End of Lecture]