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MATH 444 HW 7
5B, 5C, 5D, 5E, 5F

5B Prove Corollary 5.3 (to Pasch's theorem)

Theorem 5.2 (Pasch's theorem): Suppose ΔABC is a triangle and ℓ is a line that does not contain any of the points A, b, C. If ℓ intersects one of the sides of ΔABC, then italso intersects another side.

Corollary 5.3: If ΔABC is a triangle and ℓ is a line that does not contain any of the points A, B, C, then either ℓ intersects exactly two sides of ΔABC or it intersects none of them.

ℓ is a line. It does not contain any of the points A, B, C, so it is not collinear to any of the segments $\overline{AB}, \overline{BC}, \overline{AC}$

Case: ℓ does not intersect any of the line segments.

Then ℓ does not intersect any of the line segments.

Case: ℓ intersects one of the line segments. Then by theorem 5.2, it intersects another side.

Then ℓ intersects exactly two sides of ΔABC

5C Suppose ΔABC is a triangle and ℓ is a line (which might or might not contain one or more vertices). Is it possible for ℓ to intersect exactly one side of ΔABC? Exactly two? All three? In each case, either give an example or prove that it is impossible.

5D Prove Theorem 5.8 (The converse to the isoceles triangle theorem). [Hint: One way to proceed is to construct an indirect proof, like Euclid's proof of proposition 1.6. Another is to mimic Pappus's proof of the isosceles triangle theorem.]

5E Prove Theorem 5.10 (The triangle copying theorem)

5F Prove Theorem 5.18 (The triangle inequality)