Conjecture 9.1

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Theorem 9.1. Let AB and AC be two tangent lines from a point A outside of a circle. Then AB is congruent to AC.

Proof. Construct circle with center X. Plot the point A outside of the circle, and construct tangent lines from point A to the circumference of circle X so that the two points where the lines and circle meet are labeled B and C. Draw radii BX and CX. Construct a line segment from point X to point A to create two separate triangles ABX and ACX.

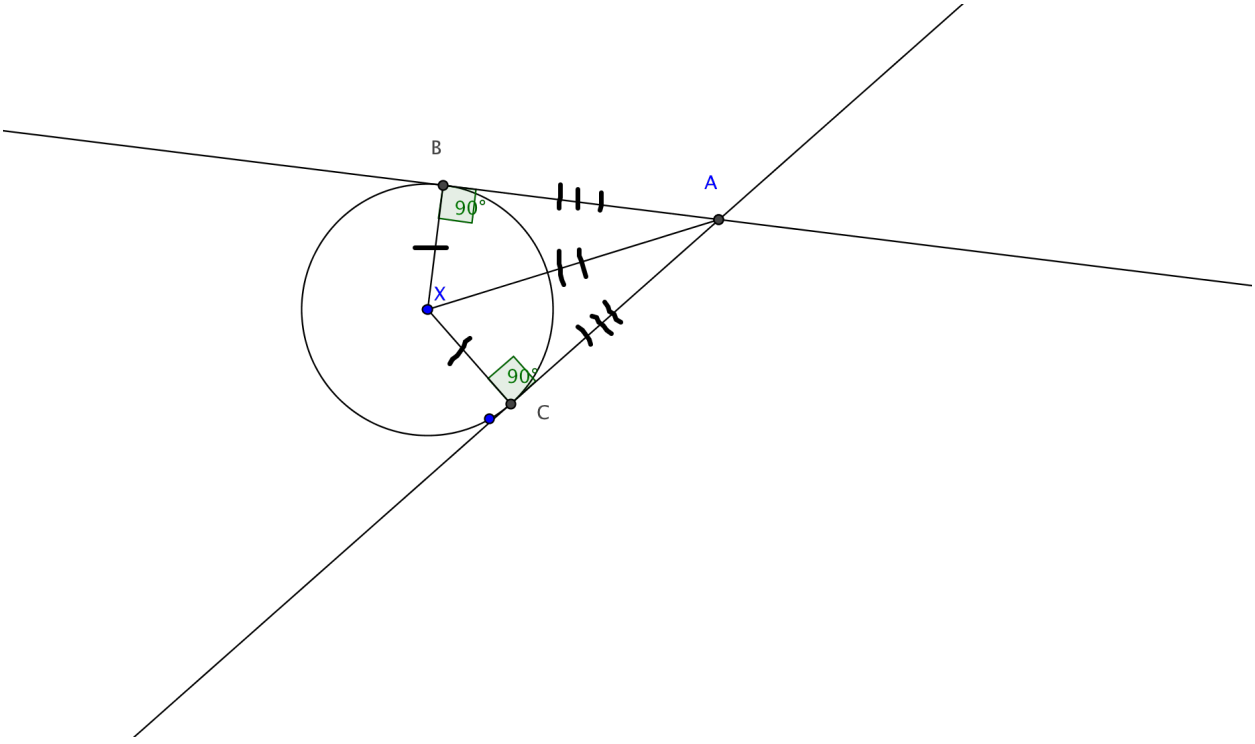

Figure 1: Circle X with tangent lines AB and AC

By Euclid III.18, we know that angles ABX and ACX are both right angles, and therefore congruent. Since line segments XB and XC are both radii of circle X, we know that they are congruent in length. Since side AX is used in both triangles, we know that they each have that side in common. We now have two right triangles with congruent hypotenuses and one

congruent leg. Using Ms. Freking's proof of theorem 7.2, we can conclude that these two triangles are congruent using her right angle, leg, hypotenuse conjecture. Since ABX and ACX are congruent triangles, AB is congruent to AC.

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