

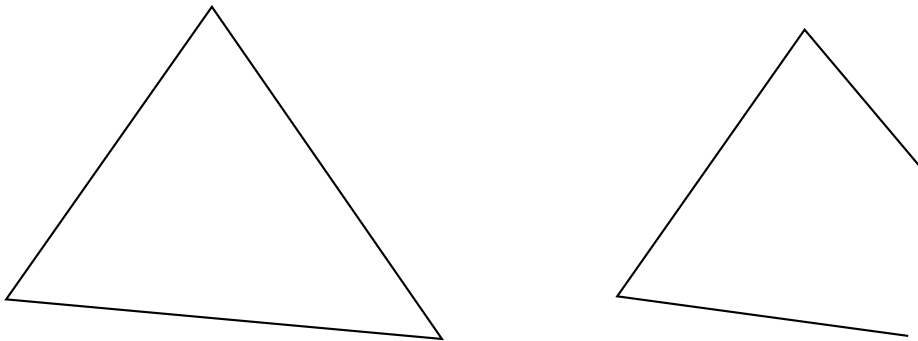
The Law of Cosines and Real Estate

February 25, 2010

A parcel of land is specified by something called a legal description. The following legal description is for a triangular plot of land:

1. BEGINNING at the tree stump on the corner of Avenue A and Christopher Street, thence traveling due east a distance of 100 yards;
2. thence traveling northwesterly a distance of 52 yards along a segment making an angle of approximately 31.57854604 degrees with the previous line;
3. thence traveling southwesterly a distance of 62 yards along a segment making an angle of approximately 122.3683156 degrees with the previous line.

We want to make sure that this describes a closed plot of land, such as the figure on the left, as opposed to the figure on the right.



In this worksheet, we will make sure that the legal description above actually does describe a plot whose boundary closes.

1. Assuming the legal description above defines a triangle, sketch this triangle. Label all side lengths and angle measures.

2. Sketch a triangle with side lengths $a = 52$ yards, $b = 62$ yards and $c = 100$ yards. Label the angle opposite side a by the capital letter A , the angle opposite side b by the capital letter B , and the angle opposite side c by the capital letter C .

3. The Law of Cosines states:

$$\begin{aligned}a^2 &= b^2 + c^2 - 2bc \cos A \\b^2 &= a^2 + c^2 - 2ac \cos B \\c^2 &= a^2 + b^2 - 2ab \cos C.\end{aligned}$$

Use the Law of Cosines (and any other tools you can think of) to find all of the angles in the triangle you sketched in question 2 above. *Note: You will need to find the arc-cosine at some point in these calculations!*

4. Compare the triangle from question 3 with the triangle you sketched using the legal description. If they are the same, the boundary closes! Otherwise, there is a problem with this parcel.