

# PROBLEM CORNER

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and

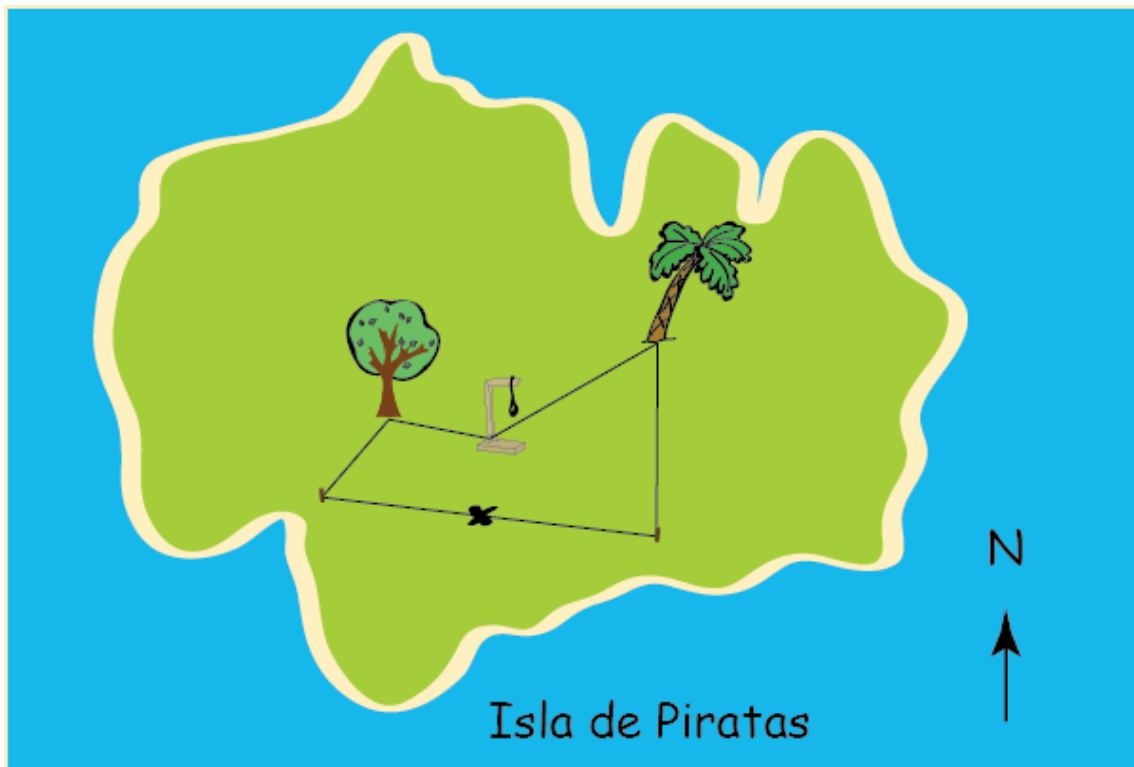
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## Problem 1

Esteban was going through the attic of his grandfather's house and found a paper describing the location of a buried treasure on a particular Island. The note said that on the island one would find a gallows, an oak tree, and a palm tree. To locate the treasure one would begin at the gallows, walk to the palm tree, turn right  $120^\circ$  and walk the same number of paces away from the palm tree. Drive a spike into the ground at this point. Then return to the gallows, walk to the oak tree and turn left  $60^\circ$  and walk the same number of paces away from the oak tree. Drive a second spike in the ground at this point. The midpoint of a string drawn between the two spikes would locate the treasure. Esteban and his friends mounted an expedition to the island, found the oak tree and the palm tree mentioned in the note, but the gallows had rotted away long ago. They returned home with the map above and no treasure.

Can you help these young men find the location of the treasure?

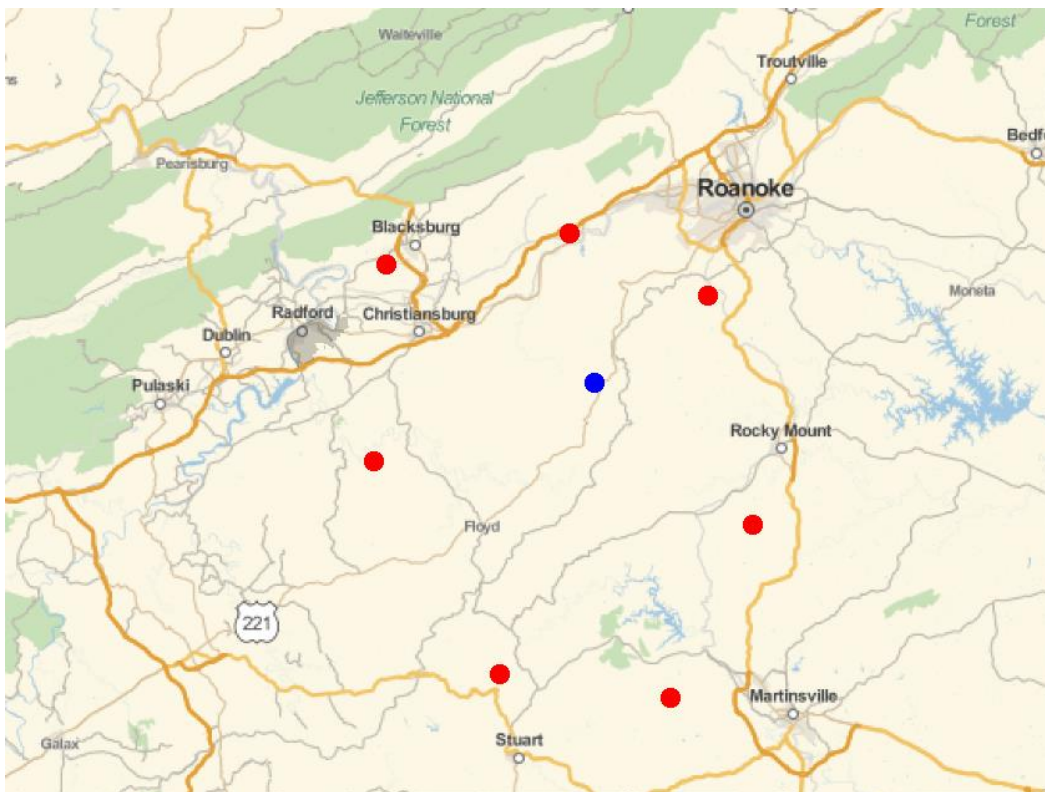


Reference: by <http://jwilson.coe.uga.edu/emt725/Treasure/Treasure.html>

## Problem 2

A set of points  $(x_i, y_i)$  is given in the table below, representing the geographic location of a set of airfields that can be used for emergency landing. These are shown as red points on the map below. A new airfield is added at  $P = (8,5)$ , (not included in the table below), shown as a blue dot on the map. Define the region  $\mathbf{R}$  as the set of points that are closer to the point  $P$  than to any of the points in the table. Then an airplane that encounters an emergency while over any point in this region should attempt to land at  $P$ . Determine the exact area of the region  $\mathbf{R}$ . Assume that the coordinates are in kilometers from a conveniently chosen origin and assume the points lie in a plane. Use the standard distance formula in the Cartesian plane to measure the distance between the points.

$x$	27	19	-10	-32	-29	-2	23
$y$	1	23	30	17	-10	-30	-28



Bonus question: What effect would using great circle distance have on the shape and area of this region assuming the coordinates given are (latitude, longitude) in degrees? Note, these numbers as degrees would mean the points cover a much larger geometric region than that shown in the map above.