1.1 Theoretical competition

Problem 1

A young radio amateur maintains a radio link with two girls living in two towns. He positions an aerial array such that when the girl living in town A receives a maximum signal, the girl living in town B receives no signal and vice versa. The array is built from two vertical rod aerials transmitting with equal intensities uniformly in all directions in the horizontal plane.

a) Find the parameters of the array, i. e. the distance between the rods, its orientation and the phase shift between the electrical signals supplied to the rods, such that the distance between the rods is minimum.

b) Find the numerical solution if the boy has a radio station transmitting at 27 MHz and builds up the aerial array at Portorož. Using the map he has found that the angles between the north and the direction of A (Koper) and of B (small town of Buje in Istria) are 72° and 157°, respectively.