**Island Treasure**

A young man 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:

On the island one would find a shed, an oak tree, and a pine tree. To locate the treasure, one would begin at the shed, walk to the pine tree, turn right 90 degrees and walk the same number of paces away from the pine tree. A spike was to be driven at that point. Then return to the shed, walk to the oak tree and turn left 90 degrees and walk the same number of paces away from the oak tree. Drive a second spike in the ground. The midpoint of a string drawn between the two spikes would locate the treasure.

The young man mounted an expedition to the island, found the oak tree and the pine tree but no shed. It had been eliminated years ago without a trace. They returned home with the map above and no treasure.

(Gamow, George (1947). One Two Three . . . Infinity)

Q.1 Let's find where the treasure is!

However, we do not know the location of the shed, so let's decide its location! (Try some patterns)

Q.2 Let’s show that the location of the treasure is independent of the shed’s location!

Oak Tree

Pine Tree



Hints:

1. Think of the island as a complex plane (Gaussian plane).
2. The line passing through the oak and pine trees is taken as the real axis.
3. The origin is at the midpoint of the oak and pine trees, and the imaginary axis is a line passing through the origin and perpendicular to the real axis.
4. Let the oak tree’s position be -1 and the pine tree’s position be 1.
5. Let’s show arbitrary shed position as $r=a+bi$ ($a, b$: real number)
6. Find the complex number representing the position of the first pile E and the complex number representing the position of the second pile F.