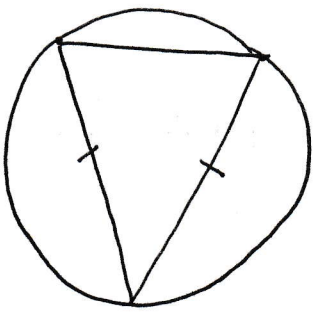
# Interview II (40 minutes)(2 interviewers)

Q1) · Prove that $x^2+y^2 \geq 2xy$, $x,y \in \mathbb{R}$.

· Prove that $p^4+q^4+r^4+s^4 \geq 4pqrs$, $p,q,r,s \in \mathbb{R}$.

Q2) · Consider an ~~(scole)~~ iscoceles triangle inscribed in a circle as shown, radius of the circle is 1



How would the triangle have to look in order for the area to be a maximum?[2]

· Now consider a general triangle inscribed in a circle, how would the triangle with maximum area look.[2]

Q3) · Consider a game played with a fair coin, I toss the coin until either 2 heads (HH) or ~~&~~ 2 tails (TT) come up one after another. I win the game if HH, you win if TT, find the probability that I win the game ~~$~~.

· I$ that a surprising answer?

· What if I won if HH and you won ~~&~~ if HT?

· And what if I won if HH and you won if TH?

NB: As is standard for Mathematics interviews, I had no non-mathematical questions and interviewers simply greeted, explained they would be asking me mathematics problems and proceeded to do so.