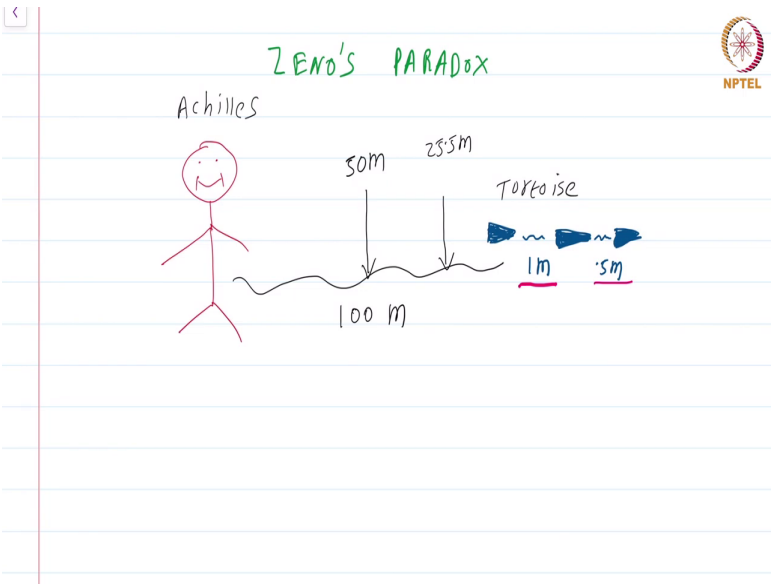
Real Analysis - I
Dr. Jaikrishnan J
Department of Mathematics
Indian Institute of Technology, Palakkad

Lecture - 1.5
Zeno's Paradox

(Refer Slide Time: 00:15)



A Paradox is a statement for which one can give an argument as to why it is true, as well as an argument as to why it is false. In today's module I will present Zeno's paradox. Zeno of Elea was a 5th century philosopher, who is famous for many of his logical puzzles. The puzzle I am going to present today intrigue philosophers and mathematicians for more than 2 millennia. This paradox involves a race between the great warrior Achilles and the tortoise. Achilles being a noble warrior, gives the tortoise a lead of 100 meters.

The race starts, to catch the tortoise, Achilles must first traverse half the distance between Achilles and the tortoise; that is 50 meters. But in the time that Achilles has traveled 15, 50 meters, the tortoise being much slower would have traversed maybe 1 meter. Now, the distance between the tortoise and Achilles is 51 meters.

To catch the tortoise, Achilles now has to traverse half the distance between the tortoise and himself; which is 25.5 meters, but in that time the tortoise would have traveled some distance let us say, half a meter. Now, the paradox becomes clear. The tortoise will

always be ahead of Achilles simply because at any given point of time Achilles has to first travel half the current distance between himself and the tortoise; in the time that it takes Achilles to traverse half the distance, the tortoise would move slightly ahead. So, Achilles will never ever catch the tortoise.

Obviously, in real life we all know if there is a race between Achilles and the tortoise Achilles is going to have tortoise soup for dinner. Calculus is one of the ways of resolving this paradox, not the sole one, once we define convergence of infinite series, we will have a satisfactory resolution of the paradox.