
Introduction

“Not having achieved what they desired, they pretended to desire what they had achieved.”

M. Montel

In this series of lectures I will talk about several new directions in mathematical research. All of these are based on the idea of numerical experimentation. After looking at examples such as $5 \cdot 5 = 25$ and $6 \cdot 6 = 36$, we advance an hypothesis, such as $7 \cdot 7 = 47$. Further experimentation either supports or disproves it.

For example, Fermat’s hypothesis (that the equation $x^n + y^n = z^n$ cannot be solved in natural numbers with $n > 2$) was advanced as a result of his attempts at a solution. This hypothesis led to the creation of a whole field of knowledge, but it was proved only after a few hundred years had passed.

The majority of hypotheses that we make are so far not proven (nor refuted). I decided to give these lectures exactly because of my hope that the listeners will help in the investigation of these problems, if only by conducting numerical experiments (which I have also conducted, without a computer, in the bounded region of the first million numbers).