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| Fermat’s Last Theorem | Research Project B: Pascal’s triangle | Math 151 - Professor Klatt | Casey Carnnia |  |
| http://www.math.rochester.edu/people/faculty/doug/images/fermat1.jpg | | | | |

Fermat’s Last Theorem

In learning about this subject and thinking about complex concepts, it was pleasant to see the process of discovery. Going beyond academic values it was hart warming to see how some of the most brilliant minds in mathematics struggle with questions.

Fermat was a French judge that enjoyed studying mathematics as a hobby. He was studying Arithmetica which is book of Greek text on mathematics. Habitually, Fermat made notes in the margins of the book about the relevant subject that he was considering. When he arrived at the Pythagorean thermo (a2+b2=c2) and in thinking about the whole numbers that could satisfy the equation (32+42=52, 52+122=132…) he advanced to realize that the set of whole numbers that satisfied the solution were infinite. However, almost simultaneously, he seemed to know that we will never find an answer to this equation if we changed the exponents (a3+b3=c3, a4+b4=c4… an+bn=cn). This is to say so long as the exponent was 2 the answer set is infinite and if the exponent was other than 2 the answer set is empty no matter how far one looks for the answer. But evaluating this idea by trial and error is impossible because when we start with the first number we have infinite number of other numbers to yet check. And after checking the first number we are not one step closer to the end of the set of numbers that we should be examining. This limitless nature of possibilities required a mathematical proof based on other previously established theorems. Surprisingly Fermat notes that he knows such a proof but the margin of the book is too small for the elegant proof that he has imagined.

After Fermat’s passing others look at the notes that he had written in the margins and one by one establish an explanation for each scribble and at last we are left with the problem of variations on the Pythagorean thermo for which no one was able to find a proof. The story remains unresolved until the twentieth century. A young man named Andrew Wiles reads about this in a book from his local library in Cambridge England and tries to solve the problem. He studies math and all through his studies he never forgets about this unsolved problem. Latter in his thirties as a professor he is exposed to a paper by a pair of Japanese mathematicians: Taniyama and Shimura, concerning a conjecture (unproven fact) about a different subject. Professor Wiles invested seven years of complete concentration in proving the Japanese conjecture so that he could use it as a tool to prove Fermat’s theorem.

After Wiles announced that he had found the proof and during the peer review process the complicated procedure was not able to be reproduce and it took another year before the issue could be put to rest.

**All Elliptic Curves are Modular => Taniyama and Shimura conjecture => Fermat’s last theorem**

So finally, even though professor Wiles proved the Fermat’s theorem, we still do not know what solution Fermat actually had in mind. The techniques that Wiles used were not known during Fermat time.

Works Cited

BBC, Horizons. “Fermat’s Last Theorem”. 11/29/2013 <http://www.youtube.com/watch?v=7FnXgprKgSE>.

Wikipedia Fermat’s Last Theorem Version. 11/29/2013 <http://en.wikipedia.org/wiki/Fermat%27s\_Last\_Theorem>.

