Jonathan Quang 2/8/15

Math Research

Homework #4

The Ramanujan House problem was recently proposed to the class. We were first given a smaller problem. If there were 300 houses, what house number would the sum of all the numbers before it equal the sum of all the numbers after it. It is known that the sum of all integers between 0 and n can be represented by . In this case, the sum of all 300 house numbers would be . If one lets y = the house number that satisfies the two conditions, the sum of all numbers after = the sum of all numbers before. This can be represented by - the sum of all numbers before = the sum of all numbers before. The equation completely setup is -=. This simplifies to 90300 = 2y2. The quadratic equation that results is 0 = 2y2-2y-90300. The positive value of y here is 212.98499... This implies that the house number is about 213. The overall formula for finding the house number with x amount of houses can be simplified to x2+x = 2y2. What this tells us is that x and y do indeed have some relationship. Such possible values that satisfy this are house number 6 out of 8 houses, 35 and 49, and 204 out of 288.