

英文摘要

The subject of this thesis is to analyze the math game of “DIFFY BOX” . The content is as follows:

Take down a nonnegative integer on four apexes of a square, and then calculate the positive difference of adjacent angles, put down the midpoint of four sidelines, work out the positive difference of adjacent midpoints, and take down on the four apexes. Reduplicate the procedures until a number with four zeros appears.

Three years ago, I conducted the students to take part in the competition of science exhibition with this subject. At that time, the researcher deeply believed that the four nonnegative integers would get a number with four zeros, but the researcher didn't have verification at the end: thereupon, the researcher wants to reconsider the subject now to figure out the question.

The researcher undertook Chapter 4 and make use of the concepts of Mathematical Induction and nondecreasing-sequence to verify the hypothesis that the nonnegative integer of DIFFY BOX would get a number with four zeros under the finite steps. And then, the researcher extends the above-mentioned conclusion to the real number of DIFFY BOX, and it would also have the same conclusion. Make use of the method of 4.9(p.26), turn $[a, b, c, d]$ of DIFFY BOX, where $a > b > c > d$, into $[0, 1, x, y]$. The purpose is to change four unknown numbers in Chapter 3 about studying the complicated condition of $[a, b, c, d]$ into two unknown numbers. At this time, $[0, 1, x, y]$ of DIFFY BOX satisfies $x + 1 \geq y > x > 1$, and most of the DIFFY BOX in this ambit would get a number with four zeros through seven steps at most, as Chart 5.1(p.28); however, in the more and more limited ambit, (x, y) could get a number with four zeros through many steps.

At last, the researcher brings up a hypothesis: when DIFFY BOX is $[0, 1, q(q-1), q]$ (q is the solution of $x^3 - x^2 - x - 1 = 0$), $l[0, 1, q(q-1), q] = +\infty$. Hereunto, although the researcher does not continue probing into this phenomenon, it breaks another new studying field.