Problem: WOM
Wombat

Qualifications, 19.10.2013

Puffnootsy the wombat is the favourite pet of Andrew Citrus — the Mayor of Limonia. Earlier it belonged to Andrew's father, who passed it to his son. The Mayor wants to build his wombat a new pen so he can perform various frolics and feel just like a real Australian wombat.

Puffnootsy is an animal that has more than a few years on the back of his neck and is no longer in its prime. In particular, he does not see well, so he uses the sense of smell for orientation. To make it easier for Puffnootsy to move inside the pen, Andrew Citrus came to the conclusion, that the pen should be as uncomplicated in shape as possible. He plans it to be a polygon, in which every two neighbour sides are perpendicular to each other. An additional convenience for the wombat will be the fact that every two sides will be of different lengths expressed in integers. Thanks to that, Puffnootsy, sniffing the wall from the beginning to the end, will learn its length, so that he will always know his current position inside the pen.

So Andrew Citrus faced a difficult task of designing the pen so that it meets requirements listed above. Moreover, he wishes it consisted of precisely n walls. Help him and suggest a design for such a pen! As pen should be built according to strict Limonian standards (thus it will be quite expensive), the Mayor will appreciate if you do your best to minimize the circumference of the pen.

Input

In the first and only line of the input file there is one integer n ($6 \leqslant n \leqslant 20\,000$) specifying the number of the walls the pen should consist of. You can assume that there exists a pen with n walls that meets the problem's requirements.

Output

In the first line of the output file there should be a number p specifying the circumference of the constructed pen. In the next n lines there should be the description of the constructed pen. In the i-th line there should be two integers specifying the coordinates of the i-th vertex of the pen.

The walls of the pen have to be parallel to the axes of the coordinate system. All of the vertices have to be pairwise different. The vertices printed in two consecutive lines must be neighbours on the circumference of the pen. No wall of the pen can have any common points with other walls, except for a common end of neighbouring walls. The absolute value of the vertex coordinates must not exceed 10^{12}.

Scoring

In case of the correctly constructed pen, the score for a test is p. This is a minimization problem, therefore, the shorter the circumference, the better. The percentage of guaranteed points is 20%.

Example

For the input data:

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6
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the correct result is:

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24
0 0
5 0
5 1
2 1
2 7
0 7
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Explanation of the example: The sequence of vertices above describes the pen with circumference of 24 that meets the problem's requirements. However, it is not the pen with shortest circumference possible for $n = 6$.