British Informatics Olympiad Final

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Paper Folding

Imagine taking a long strip of paper and folding it in half, by bringing the right edge up and onto the left edge. If you now unfold this strip of paper, so that it finishes in its original position (i.e. with the same surface uppermost and the original left edge still at the left) you will have a strip of paper with a crease in the middle which dips downwards.

Imagine taking a new strip of paper, folding it in half (by bringing the right edge up and onto the left edge) and then folding it in half again (again, bringing the new right edge up and onto the left edge). If you now unfold the strip of paper (again so that it finished in its original position) you will find three creases. Moving from left to right these will dip downwards, downwards then upwards.

If we did this with real paper we would reach a stage at which the paper became too thick to fold, but we can consider what would happen if we were able to continually fold the paper.

Write a program which determines whether specified creases are downwards or upwards after a given number of folds. You should input a single line containing a pair of integers, f ($2 \leq f \leq 5000$) followed by c ($1 \leq c \leq 2^f - 3$), indicating a number of folds and a crease number (counting from left to right, where 1 is the leftmost crease). You should output 3 letters, each either a `D` or a `U` (standing for *downwards* or *upwards* respectively), indicating the orientation of the c^{th} crease, then $c + 1^{th}$ and finally $c + 2^{th}$.

Sample Input

```
3 2
```

Sample Output

```
DUD
```

Credit is available for partial programs which are able to deal with fewer than 31 folds.