CURVES

Let **C** be a cloud of **N** points $X(x, y)$, where x and y are 16-bit unsigned integers.

Let $X_\alpha(x_\alpha, y_\alpha)$ be an initial point and, likewise, let $X_\omega(x_\omega, y_\omega)$ be a final point ($x_\alpha \ll x_\omega$ and $y_\alpha \ll y_\omega$).

Your task is to find a strictly monotonic sequence of points in **C**, $\{X_i\}|_\alpha^\omega$, which is either concave or convex, such that the sum of the lengths (in the Euclidean distance) of all sequential pairs $\{X_k, X_{k+1} \in \{X_i\},\ \alpha \le k < \omega\}$ is maximal in the restriction $\{\Delta x < R_x,\ \Delta y < R_y\}$.

Given three consequent elements of $\{X_i\}$, e.g. X_{j-1}, X_j and X_{j+1}, and considering the line (X_{j-1}, X_{j+1}), then $\{X_i\}$ is concave if X_j is above the named line and convex if X_j is below the line.

If $\{X_k(x_k, y_k), X_{k+1}(x_{k+1}, y_{k+1}) \in \{X_i\} : (\alpha \le k < \omega) \iff ((x_k < x_{k+1}) \wedge (y_k < y_{k+1}))\}$, then $\{X_i\}$ is a strictly monotonic sequence.

Input file "input_curves":

$Row_0|Set_0 : 0\, R_x\, R_y$
$Row_1|Set_0 : 0\, x\, y$
$Row_2|Set_0 : 0\, x\, y$
$\ldots$
$Row_{final_0-1}|Set_0 : 0\, x\, y$
$Row_{final_0}|Set_0 : 0\, x_\alpha\, y_\alpha\, x_\omega\, y_\omega\, convex|concave$
$Row_{final_0+1}|Set_1 : 1\, R_x\, R_y$
$Row_{final_0+2}|Set_1 : 1\, x\, y$
$Row_{final_0+3}|Set_1 : 1\, x\, y$
$\ldots$
$Row_{final_1-1}|Set_1 : 1\, x\, y$
$Row_{final_1}|Set_1 : 1\, x_\alpha\, y_\alpha\, x_\omega\, y_\omega\, convex|concave$
$\ldots$

Output file "output_curves":

$Row_0|Set_0 : 0\, length$
$Row_1|Set_0 : 0\, x_\alpha\, y_\alpha$
$Row_2|Set_0 : 0\, x\, y$
$Row_3|Set_0 : 0\, x\, y$
$\ldots$
$Row_{final_0-1}|Set_0 : 0\, x\, y$
$Row_{final_0}|Set_0 : 0\, x_\omega\, y_\omega$
$Row_{final_0+1}|Set_1 : 1\, length$
$Row_{final_0+2}|Set_1 : 1\, x_\alpha\, y_\alpha$
$Row_{final_0+3}|Set_1 : 1\, x\, y$
$Row_{final_0+4}|Set_1 : 1\, x\, y$
$\ldots$
$Row_{final_1-1}|Set_1 : 1\, x\, y$
$Row_{final_1}|Set_1 : 1\, x_\omega\, y_\omega$
$\ldots$

Should there be no such sequence $\{X_i\}|_\alpha^\omega$, you should output a single line "set_number NO" in "output_curves".