Polynomial Equation

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1.5 seconds
Memory limit:	1024 megabytes

Busy Beaver has a polynomial equation that he doesn't know how to solve, and he needs your help!

For a bivariate polynomial $P(x, y) = \sum_{i,j\geq 0} a_{i,j}x^iy^j$, define its degree $\deg P = \max_{a_{i,j}\neq 0}(i + j)$. For example, $\deg(x + y + xy) = 2$. Furthermore, we take the degree of the zero polynomial $\deg 0$ to be -1.

Given a bivariate polynomial $P(x, y)$ with integer coefficients and an integer $d \geq -1$, determine whether there exists a bivariate polynomial $S(x, y)$ and non-constant univariate polynomials Q, R such that

- for $p = 10^9 + 7$, we have

  $$(P(x, y) + S(x, y))(Q(x) - Q(y)) = R(x) - R(y)$$

  as polynomials in $\mathbb{F}_p[x, y]^*$,
- $\deg S \leq d$.

If a solution exists, output any valid Q, R. **Note that you do not need to output S.**

Input

Each test contains multiple test cases. The first line contains the number of test cases T $(1 \leq T \leq 100)$. The description of the test cases follows.

The first line of each test case contains two integers n, d $(1 \leq n \leq 2.5 \cdot 10^3,\ -1 \leq d < n)$ — the value of $\deg P$ and the upper bound on $\deg S$, respectively.

The i-th of the next $n+1$ lines contains $n+2-i$ integers $a_{i-1,0}, \ldots, a_{i-1,n+1-i}$ $(0 \leq a_{i,j} < 10^9 + 7)$ — the coefficients of P so that $P(x, y) = \sum_{i,j\geq 0, i+j\leq n} a_{i,j}x^iy^j$. It is guaranteed that P has degree n, i.e. at least one of $a_{0,n}, a_{1,n-1}, \ldots, a_{n,0}$ is nonzero.

It is guaranteed that the sum of n across all test cases is no more than $2.5 \cdot 10^3$.

Output

The first line of output for each test case should contain the string "`YES`" (without quotes) if a solution exists, and "`NO`" (without quotes) otherwise.

If you claim that a solution exists, continue outputting the solution as follows:

The second line of output for each test case should contain three integers q, r $(1 \leq q, r \leq 5 \cdot 10^3)$ — the degrees of the polynomials Q, R respectively.

The third line of output for each test case should contain $q + 1$ integers $b_0, \ldots, b_q$ $(0 \leq b_i < 10^9 + 7,\ b_q \neq 0)$ — the coefficients of $Q(t) = \sum_{i=0}^{q} b_it^i$.

The fourth line of output for each test case should contain $r + 1$ integers $c_0, \ldots, c_r$ $(0 \leq c_i < 10^9 + 7,\ c_r \neq 0)$ — the coefficients of $R(t) = \sum_{i=0}^{r} c_it^i$.

Note that you do not need to output S — the judge will determine if a suitable choice of S exists for your claimed Q, R.

You can output "`YES`" and "`NO`" in any case (for example, strings "`yES`", "`yes`" and "`Yes`" will be recognized as a positive response).

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*i.e. when expanded, the two sides of the equation have equal coefficients modulo p.

Scoring

There are five subtasks for this problem.

- (5 points): The sum of n across all test cases is no more than 10, and $d = -1$, i.e. we constrain that S is the zero polynomial.
- (5 points): $d = n - 1$.
- (30 points): $d = -1$, i.e. we constrain that S is the zero polynomial.
- (30 points): The sum of n across all test cases is no more than 500.
- (30 points): No additional constraints.

Example

<table>
<tr><th>standard input</th><th>standard output</th></tr>
<tr><td><pre>5
2 -1
40 9 13
9 0
13
4 2
1000000000 1 1000000001 2 1
1 1000000000 2 0
999999999 2 1
2 0
1
4 2
1000000000 1 1000000001 2 1
1 1000000000 1 0
999999999 1 1
2 0
1
4 2
120 50 61 235 169
50 81 119 0
61 119 169
235 0
169
9 5
17 18 19 20 21 22 2 6 0 1
16 8 8 4 8 0 2 0 0
15 8 0 4 0 0 0 0
14 4 4 2 4 0 1
13 8 0 4 0 0
12 0 0 0 0
2 2 0 1
6 0 0
0 0
1</pre></td><td><pre>YES
2 4
20 9 13
400 360 601 234 169
NO
YES
2 6
1 1 1
2 4 7 7 6 3 1
NO
YES
3 12
0 2 0 1
0 0 0 16 16 24 32 12 24 2 8 0 1</pre></td></tr>
</table>

Note

In the first test case, the given polynomial is

$$P(x, y) = 13x^2 + 13y^2 + 9x + 9y + 40.$$

We can take $S = 0$, $Q(t) = 13t^2 + 9t + 20$, $R(t) = (13t^2 + 9t + 20)^2$, which gives a valid solution.

In the second test case, it can be shown that no solution exists.