Computational Number Theory
Programming HW 5

Due Date: 28/11/2022

Input: The input is a csv file with the first line having a prime p that is less than 10^7. Each subsequent line is of the form $d, i, a_d, a_{d-1}, \ldots, a_0$. This represents a pair $(f(x), i)$, where $f(x) = a_d x^d + a_{d-1} x^{d-1} + \ldots + a_0$ is a polynomial in $\mathbb{Z}_p[x]$, and the goal is to factorize $f(x)$ given that each of its irreducible factors has degree equal to i.

The number of test cases will be at most 5 and the value of d will be in $\{2, \ldots, 30\}$. All instances will have the leading coefficient as 1. A sample input file is attached.

Output: For each polynomial $f(x) \in \mathbb{Z}_p[x]$, print each of its irreducible factors as a sequence of coefficients on one line.

Output for the given sample input file (input-CZ.csv):

```
1,317845
1,787237
1,868944

1,75963,639429
1,381067,873026
1,470840,793798
1,64421,92353

1,222613,65456,55363
1,205972,271642,493043
1,420119,251124,538468
1,404206,178665,872765
1,943623,243143,942530

1,473938,630954,824457,356777,81717,627235
1,63434,53353,13530,0,22643,57541
1,119366,749238,681331,613428,420559,716564
1,420745,820563,601116,225233,163860,847631
```

```
1,0,225316,0,0,3,0,70234,0,1913,0,0,0,124214,34009,213132
1,0,5,0,1,0,25,0,0,0,436413,225323,0,0,423509,212491
```