```
> # Set the parameters and functions
  c :='c':
  d :='d':
  u :='u':
  E1 := (183024000 c - 791784000) u^7 + (2417784000 c^2 + 1460715645 - 305040000 d^3
        - 6118762644 d) u^6 + (244032000 c^5 + 8192593740 c^3 + 8764293870 c - 1787808000 d^4
        - 16539837939 d^2) u^5 + (454024000 c^6 + 11995799436 c^4 + 21910734675 c^2 - 20336000 d^7
        - 3895710192 d^5 - 20672142240 d^3) u^4 + (274022516 c^7 + 9314947674 c^5 + 29214312900 c^3
        - 3027621693 d^6 - 12038214600 d^4) u^3 + (3003986430 c^6 + 21910734675 c^4 - 851031096 d^7
        - 3744303660 d^5) u^2 + (8764293870 c^5 - 272995548 d^7 - 2533430649 d^6) u + 1460715645 c^6
        - 1368058644 d^7 :
  print(Output);
  # find Sturm's sequence` `
    for j from 0 by 1 to 39 do
   c := 4 + (j + 1)/40 · (4001/1000 - 4) :
   d := 4 + j/40 · (4001/1000 - 4) :
  u :='u':
  S := sturmseq(E1, u);
  signnum := sturm(S, u, 4, 5256/1000);
   with(ArrayTools) :
   Slength := Size(S, 2);
  X := Array(1 .. Slength);
  Y := Array(1 .. Slength);

      for i from 1 to Slength do
   # Find sgn [s_{'E'}_{1,i}(0)]
        u := 4;
        X[i] := signum(S[i]);
   # Find sgn [s_{'E'}_{1,i}(5.256)]
        u := 5256/1000 :
        Y[i] := signum(S[i]);
     end do;
   # show the final results
   print(['a'[j],'a'[j + 1], sgn(s['E'[1, j]](4)), sgn(s['E'[1, j]](5.256))] = [evalf(c, 5), evalf(d, 5), X,
        Y]) ;
  end do:
```

## Output

$$\left[a_0, a_1, sgn\left(s_{E_{1,0}}(4)\right), sgn\left(s_{E_{1,0}}(5.256)\right)\right] = [4.0000, 4., [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1], [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1]]$$

$$\left[a_1, a_2, sgn\left(s_{E_{1,1}}(4)\right), sgn\left(s_{E_{1,1}}(5.256)\right)\right] = [4.0000, 4.0000, [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1], [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1]]$$

$$\left[a_2, a_3, sgn\left(s_{E_{1,2}}(4)\right), sgn\left(s_{E_{1,2}}(5.256)\right)\right] = [4.0001, 4.0000, [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1], [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1]]$$

$$\left[a_3, a_4, sgn\left(s_{E_{1,3}}(4)\right), sgn\left(s_{E_{1,3}}(5.256)\right)\right] = [4.0001, 4.0001, [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1], [-1\ 1\ 1\ 1\ -1\ -1\ 1\ -1]]$$

$$\left[a_4, a_5, sgn\left(s_{E_{1,4}}(4)\right), sgn\left(s_{E_{1,4}}(5.256)\right)\right] = \left[4.0001, 4.0001, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_5, a_6, sgn\left(s_{E_{1,5}}(4)\right), sgn\left(s_{E_{1,5}}(5.256)\right)\right] = \left[4.0002, 4.0001, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_6, a_7, sgn\left(s_{E_{1,6}}(4)\right), sgn\left(s_{E_{1,6}}(5.256)\right)\right] = \left[4.0002, 4.0002, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_7, a_8, sgn\left(s_{E_{1,7}}(4)\right), sgn\left(s_{E_{1,7}}(5.256)\right)\right] = \left[4.0002, 4.0002, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_8, a_9, sgn\left(s_{E_{1,8}}(4)\right), sgn\left(s_{E_{1,8}}(5.256)\right)\right] = \left[4.0002, 4.0002, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_9, a_{10}, sgn\left(s_{E_{1,9}}(4)\right), sgn\left(s_{E_{1,9}}(5.256)\right)\right] = \left[4.0002, 4.0002, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{10}, a_{11}, sgn\left(s_{E_{1,10}}(4)\right), sgn\left(s_{E_{1,10}}(5.256)\right)\right] = \left[4.0003, 4.0002, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{11}, a_{12}, sgn\left(s_{E_{1,11}}(4)\right), sgn\left(s_{E_{1,11}}(5.256)\right)\right] = \left[4.0003, 4.0003, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{12}, a_{13}, sgn\left(s_{E_{1,12}}(4)\right), sgn\left(s_{E_{1,12}}(5.256)\right)\right] = \left[4.0003, 4.0003, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{13}, a_{14}, sgn\left(s_{E_{1,13}}(4)\right), sgn\left(s_{E_{1,13}}(5.256)\right)\right] = \left[4.0004, 4.0003, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{14}, a_{15}, sgn\left(s_{E_{1,14}}(4)\right), sgn\left(s_{E_{1,14}}(5.256)\right)\right] = \left[4.0004, 4.0004, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{15}, a_{16}, sgn\left(s_{E_{1,15}}(4)\right), sgn\left(s_{E_{1,15}}(5.256)\right)\right] = \left[4.0004, 4.0004, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{16}, a_{17}, sgn\left(s_{E_{1,16}}(4)\right), sgn\left(s_{E_{1,16}}(5.256)\right)\right] = \left[4.0004, 4.0004, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{17}, a_{18}, sgn\left(s_{E_{1,17}}(4)\right), sgn\left(s_{E_{1,17}}(5.256)\right)\right] = \left[4.0004, 4.0004, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{18}, a_{19}, sgn\left(s_{E_{1,18}}(4)\right), sgn\left(s_{E_{1,18}}(5.256)\right)\right] = \left[4.0005, 4.0004, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{19}, a_{20}, sgn\left(s_{E_{1,19}}(4)\right), sgn\left(s_{E_{1,19}}(5.256)\right)\right] = \left[4.0005, 4.0005, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{20}, a_{21}, sgn\left(s_{E_{1,20}}(4)\right), sgn\left(s_{E_{1,20}}(5.256)\right)\right] = \left[4.0005, 4.0005, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{21}, a_{22}, sgn\left(s_{E_{1,21}}(4)\right), sgn\left(s_{E_{1,21}}(5.256)\right)\right] = \left[4.0006, 4.0005, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{22}, a_{23}, sgn\left(s_{E_{1,22}}(4)\right), sgn\left(s_{E_{1,22}}(5.256)\right)\right] = \left[4.0006, 4.0006, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{23}, a_{24}, sgn\left(s_{E_{1,23}}(4)\right), sgn\left(s_{E_{1,23}}(5.256)\right)\right] = \left[4.0006, 4.0006, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{24}, a_{25}, sgn\left(s_{E_{1,24}}(4)\right), sgn\left(s_{E_{1,24}}(5.256)\right)\right] = \left[4.0006, 4.0006, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{25}, a_{26}, sgn\left(s_{E_{1,25}}(4)\right), sgn\left(s_{E_{1,25}}(5.256)\right)\right] = \left[4.0006, 4.0006, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{26}, a_{27}, sgn\left(s_{E_{1,26}}(4)\right), sgn\left(s_{E_{1,26}}(5.256)\right)\right] = \left[4.0007, 4.0006, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{27}, a_{28}, sgn\left(s_{E_{1,27}}(4)\right), sgn\left(s_{E_{1,27}}(5.256)\right)\right] = \left[4.0007, 4.0007, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{28}, a_{29}, sgn\left(s_{E_{1,28}}(4)\right), sgn\left(s_{E_{1,28}}(5.256)\right)\right] = \left[4.0007, 4.0007, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{29}, a_{30}, sgn\left(s_{E_{1,29}}(4)\right), sgn\left(s_{E_{1,29}}(5.256)\right)\right] = \left[4.0008, 4.0007, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{30}, a_{31}, sgn\left(s_{E_{1,30}}(4)\right), sgn\left(s_{E_{1,30}}(5.256)\right)\right] = \left[4.0008, 4.0008, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{31}, a_{32}, sgn\left(s_{E_{1,31}}(4)\right), sgn\left(s_{E_{1,31}}(5.256)\right)\right] = \left[4.0008, 4.0008, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{32}, a_{33}, sgn\left(s_{E_{1,32}}(4)\right), sgn\left(s_{E_{1,32}}(5.256)\right)\right] = \left[4.0008, 4.0008, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{33}, a_{34}, sgn\left(s_{E_{1,33}}(4)\right), sgn\left(s_{E_{1,33}}(5.256)\right)\right] = \left[4.0008, 4.0008, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{34}, a_{35}, sgn\left(s_{E_{1,34}}(4)\right), sgn\left(s_{E_{1,34}}(5.256)\right)\right] = \left[4.0009, 4.0008, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{35}, a_{36}, sgn\left(s_{E_{1,35}}(4)\right), sgn\left(s_{E_{1,35}}(5.256)\right)\right] = \left[4.0009, 4.0009, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{bmatrix}\right]$$

$$\left[a_{36}, a_{37}, sgn\left(s_{E_{1,36}}(4)\right), sgn\left(s_{E_{1,36}}(5.256)\right)\right] = \left[4.0009, 4.0009, \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right], \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right]\right]$$

$$\left[a_{37}, a_{38}, sgn\left(s_{E_{1,37}}(4)\right), sgn\left(s_{E_{1,37}}(5.256)\right)\right] = \left[4.0010, 4.0009, \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right], \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right]\right]$$

$$\left[a_{38}, a_{39}, sgn\left(s_{E_{1,38}}(4)\right), sgn\left(s_{E_{1,38}}(5.256)\right)\right] = \left[4.0010, 4.0010, \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right], \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right]\right]$$

$$\left[a_{39}, a_{40}, sgn\left(s_{E_{1,39}}(4)\right), sgn\left(s_{E_{1,39}}(5.256)\right)\right] = \left[4.0010, 4.0010, \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right], \left[\begin{matrix} -1 & 1 & 1 & 1 & -1 & -1 & 1 & -1 \end{matrix}\right]\right] \quad \textbf{(1)}$$

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