

> # Set the parameters and functions

c := 'c':

d := 'd':

u := 'u':

A2 := (37440000 c - 161834400) u⁸ + (353464800 c² - 12480000 d³ - 1294675200 d) u⁷
+ (1268473440 c³ - 31200000 d⁵ - 2418000 d⁴ - 4705780824 d²) u⁶ + (27040000 c⁷
+ 107719560 c⁵ + 2675588499 c⁴ - 79440400 d⁶ - 9811537866 d³) u⁵ + (38110800 c⁸
+ 3623298666 c⁵ - 2080000 d⁹ - 134505800 d⁷ - 193587675 d⁶ - 12302778060 d⁴) u⁴
+ (17631640 c⁹ + 3636140160 c⁶ - 54539419 d⁸ - 586789818 d⁷ - 8427142836 d⁵) u³
+ (9505080 c⁹ + 2471900238 c⁷ - 491379183 d⁸ - 1650242448 d⁶) u² + (586739205 c⁸
+ 1360886958 c⁷ - 195834600 d⁹) u + 648166788 c⁸ - 149179680 d⁹:

print(Output);

find Sturm's sequence`

for j from 0 by 1 to 199 do

c := $\frac{4001}{1000} + \frac{j}{200} \cdot \left(\frac{4005}{1000} - \frac{4001}{1000} \right)$:

d := $\frac{4001}{1000} + \frac{j+1}{200} \cdot \left(\frac{4005}{1000} - \frac{4001}{1000} \right)$:

u := 'u':

S := sturmseq(A2, u);

signnum := sturm(S, u, 0, $\frac{5272}{1000}$);

with(ArrayTools) :

Slength := Size(S, 2);

X := Array(1 .. Slength);

Y := Array(1 .. Slength);

for i from 1 to Slength do

Find sgn [s_{A_{2,i}}(0)]

u := 0;

X[i] := signum(S[i]);

Find sgn [s_{A_{2,i}}(5.272)]

u := $\frac{5272}{1000}$;

Y[i] := signum(S[i]);

end do;

show the final results

print(['a'[j], 'a'[1+j], sgn(s['A'[2,j]](0)), sgn(s['A'[2,j]](5.272))] = [evalf(c, 5), evalf(d, 5), X,
Y]) ;

end do;

Output

[a₀, a₁, sgn(s_{A_{2,0}}(0)), sgn(s_{A_{2,0}}(5.272))] = [4.0010, 4.0010, [1 1 1 -1 1 1 -1 -1 -1], [1 -1 -1 1 1 1 -1 -1 -1]]

[a₁, a₂, sgn(s_{A_{2,1}}(0)), sgn(s_{A_{2,1}}(5.272))] = [4.0010, 4.0010, [1 1 1 -1 1 1 -1 -1 -1], [1 -1 -1 1 1 1 -1 -1 -1]]

[a₂, a₃, sgn(s_{A_{2,2}}(0)), sgn(s_{A_{2,2}}(5.272))] = [4.0010, 4.0011, [1 1 1 -1 1 1 -1 -1 -1], [1 -1 -1 1 1 1 -1 -1 -1]]

[a₃, a₄, sgn(s_{A_{2,3}}(0)), sgn(s_{A_{2,3}}(5.272))] = [4.0011, 4.0011, [1 1 1 -1 1 1 -1 -1 -1], [1 -1 -1 1 1 1 -1 -1 -1]]

$$\begin{aligned}
& \left[a_{196}, a_{197}, \operatorname{sgn}\left(s_{A_{2,196}}(0)\right), \operatorname{sgn}\left(s_{A_{2,196}}(5.272)\right) \right] = [4.0049, 4.0049, [1\ 1\ 1\ -1\ 1\ 1\ -1\ -1\ -1], [1\ -1\ -1\ 1\ 1\ 1\ -1\ -1\ -1]] \\
& \left[a_{197}, a_{198}, \operatorname{sgn}\left(s_{A_{2,197}}(0)\right), \operatorname{sgn}\left(s_{A_{2,197}}(5.272)\right) \right] = [4.0049, 4.0050, [1\ 1\ 1\ -1\ 1\ 1\ -1\ -1\ -1], [1\ -1\ -1\ 1\ 1\ 1\ -1\ -1\ -1]] \\
& \left[a_{198}, a_{199}, \operatorname{sgn}\left(s_{A_{2,198}}(0)\right), \operatorname{sgn}\left(s_{A_{2,198}}(5.272)\right) \right] = [4.0050, 4.0050, [1\ 1\ 1\ -1\ 1\ 1\ -1\ -1\ -1], [1\ -1\ -1\ 1\ 1\ 1\ -1\ -1\ -1]] \\
& \left[a_{199}, a_{200}, \operatorname{sgn}\left(s_{A_{2,199}}(0)\right), \operatorname{sgn}\left(s_{A_{2,199}}(5.272)\right) \right] = [4.0050, 4.0050, [1\ 1\ 1\ -1\ 1\ 1\ -1\ -1\ -1], [1\ -1\ -1\ 1\ 1\ 1\ -1\ -1\ -1]]
\end{aligned}$$

(1)