

> # Set the parameters and functions

c := 'c':

d := 'd':

u := 'u':

$$E2 := (18720000 c - 80917200) u^7 + (247182000 c^2 + 158895891 - 31200000 d^3 - 625467960 d) u^6$$

$$+ (24960000 c^5 + 837743400 c^3 + 953375346 c - 182769600 d^4 - 1720233045 d^2) u^5$$

$$+ (46430800 c^6 + 1242271428 c^4 + 2383438365 c^2 - 2080000 d^7 - 398374080 d^5$$

$$- 2200094964 d^3) u^4 + (28031640 c^7 + 971831142 c^5 + 3177917820 c^3 - 311653419 d^6$$

$$- 1326447576 d^4) u^3 + (310906194 c^6 + 2383438365 c^4 - 87069840 d^7 - 431670600 d^5) u^2$$

$$+ (953375346 c^5 - 27934920 d^7 - 269600463 d^6) u + 158895891 c^6 - 139964760 d^7 :$$

print(Output);

find Sturm's sequence` `

for j from 0 by 1 to 299 do

$$c := \frac{4001}{1000} + \frac{j+1}{300} \cdot \left(\frac{4005}{1000} - \frac{4001}{1000} \right) :$$

$$d := \frac{4001}{1000} + \frac{j}{300} \cdot \left(\frac{4005}{1000} - \frac{4001}{1000} \right) :$$

u := 'u':

S := sturmseq(E2, u);

signnum := sturm(S, u, 4, $\frac{5272}{1000}$);

with(ArrayTools) :

Slength := Size(S, 2);

X := Array(1 .. Slength);

Y := Array(1 .. Slength);

for i from 1 to Slength do

Find sgn $[s_{E_{2,i}}(4)]$

u := 4;

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

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

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

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

end do;

show the final results

print(['a'[j], 'a'[j+1], sgn(s['E'[2,j]](4)), sgn(s['E'[2,j]](5.272))] = [evalf(d, 5), evalf(c, 5), X, Y]) ;

end do:

Output

$[a_0, a_1, \text{sgn}(s_{E_{2,0}}(4)), \text{sgn}(s_{E_{2,0}}(5.272))] = [4.0010, 4.0010, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]]$

$[a_1, a_2, \text{sgn}(s_{E_{2,1}}(4)), \text{sgn}(s_{E_{2,1}}(5.272))] = [4.0010, 4.0010, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]]$

$[a_2, a_3, \text{sgn}(s_{E_{2,2}}(4)), \text{sgn}(s_{E_{2,2}}(5.272))] = [4.0010, 4.0010, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]]$

$[a_3, a_4, \text{sgn}(s_{E_{2,3}}(4)), \text{sgn}(s_{E_{2,3}}(5.272))] = [4.0010, 4.0011, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]]$

$[a_4, a_5, \text{sgn}(s_{E_{2,4}}(4)), \text{sgn}(s_{E_{2,4}}(5.272))] = [4.0011, 4.0011, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]]$

$$\begin{aligned}
& \left[a_{293}, a_{294}, \operatorname{sgn}\left(s_{E_{2,293}}^{(4)}\right), \operatorname{sgn}\left(s_{E_{2,293}}^{(5.272)}\right) \right] = [4.0049, 4.0049, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]] \\
& \left[a_{294}, a_{295}, \operatorname{sgn}\left(s_{E_{2,294}}^{(4)}\right), \operatorname{sgn}\left(s_{E_{2,294}}^{(5.272)}\right) \right] = [4.0049, 4.0049, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]] \\
& \left[a_{295}, a_{296}, \operatorname{sgn}\left(s_{E_{2,295}}^{(4)}\right), \operatorname{sgn}\left(s_{E_{2,295}}^{(5.272)}\right) \right] = [4.0049, 4.0049, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]] \\
& \left[a_{296}, a_{297}, \operatorname{sgn}\left(s_{E_{2,296}}^{(4)}\right), \operatorname{sgn}\left(s_{E_{2,296}}^{(5.272)}\right) \right] = [4.0049, 4.0050, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]] \\
& \left[a_{297}, a_{298}, \operatorname{sgn}\left(s_{E_{2,297}}^{(4)}\right), \operatorname{sgn}\left(s_{E_{2,297}}^{(5.272)}\right) \right] = [4.0050, 4.0050, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]] \\
& \left[a_{298}, a_{299}, \operatorname{sgn}\left(s_{E_{2,298}}^{(4)}\right), \operatorname{sgn}\left(s_{E_{2,298}}^{(5.272)}\right) \right] = [4.0050, 4.0050, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]] \\
& \left[a_{299}, a_{300}, \operatorname{sgn}\left(s_{E_{2,299}}^{(4)}\right), \operatorname{sgn}\left(s_{E_{2,299}}^{(5.272)}\right) \right] = [4.0050, 4.0050, [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1], [-1 \ 1 \ 1 \ 1 \ -1 \ -1 \ 1 \ -1]]
\end{aligned}$$

(1)

