

> *# Set the parameters and functions*

$t := 't':$

$s := 's':$

$u := 'u':$

$$V1 := (t^{16} + 2t^{14} - 2s^{12} - 6s^{10} + 6t^6 + 2t^4 - 2s^2 - 1)u^6 + (10t^{14} + 10t^{12} - 30s^{10} - 30s^8 + 30t^6 + 30t^4 - 10s^2 - 10)u^5 + (20t^{12} - 40s^{10} - 100s^8 + 80t^6 + 140t^4 - 40s^2 - 60)u^4 + (-80s^{10} - 240s^8 + 160t^6 + 480t^4 - 80s^2 - 240)u^3 + (-784s^8 - 928s^6 + 960t^4 + 928t^2 - 176)u^2 + (-1760s^6 - 608s^4 + 1888t^2 + 480)u - 320s^4 + 2176t^2 + 1216 :$$

print Output ;

find Sturm's sequence

for j from 0 by 1 to 4 do

$t := \frac{j}{5} :$

$s := \frac{j+1}{5} :$

$u := 'u':$

$S := \text{sturmseq}(V1, u);$

$\text{signnum} := \text{sturm}(S, u, 0, 1);$

with(ArrayTools) :

$\text{Slength} := \text{Size}(S, 2);$

$X := \text{Array}(1 .. \text{Slength});$

$Y := \text{Array}(1 .. \text{Slength});$

for i from 1 to Slength do

$u := 0;$

$X[i] := \text{signum}(S[i]);$

$u := 1 :$

$Y[i] := \text{signum}(S[i]);$

end do;

show the final results

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print([ 't'[j],t'[j + 1], sgn( 's'[ 'V'[1, j](0) ]), sgn( 's'[ 'V'[1, j](1) ])]  
      = [t, s, X, Y]);
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end do:

print Output

$$\begin{aligned} \left[t_0, t_1, \operatorname{sgn}\left(s_{V_{1,0}}^{(0)}\right), \operatorname{sgn}\left(s_{V_{1,0}}^{(1)}\right) \right] &= \left[0, \frac{1}{5}, \begin{bmatrix} 1 & 1 & -1 & -1 & 1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} 1 & -1 & -1 & 1 & 1 & 1 & -1 \end{bmatrix} \right] \\ \left[t_1, t_2, \operatorname{sgn}\left(s_{V_{1,1}}^{(0)}\right), \operatorname{sgn}\left(s_{V_{1,1}}^{(1)}\right) \right] &= \left[\frac{1}{5}, \frac{2}{5}, \begin{bmatrix} 1 & 1 & -1 & -1 & 1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} 1 & -1 & -1 & 1 & 1 & 1 & -1 \end{bmatrix} \right] \\ \left[t_2, t_3, \operatorname{sgn}\left(s_{V_{1,2}}^{(0)}\right), \operatorname{sgn}\left(s_{V_{1,2}}^{(1)}\right) \right] &= \left[\frac{2}{5}, \frac{3}{5}, \begin{bmatrix} 1 & 1 & -1 & -1 & 1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} 1 & -1 & -1 & 1 & 1 & 1 & -1 \end{bmatrix} \right] \\ \left[t_3, t_4, \operatorname{sgn}\left(s_{V_{1,3}}^{(0)}\right), \operatorname{sgn}\left(s_{V_{1,3}}^{(1)}\right) \right] &= \left[\frac{3}{5}, \frac{4}{5}, \begin{bmatrix} 1 & 1 & -1 & -1 & 1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} 1 & -1 & -1 & -1 & 1 & 1 & -1 \end{bmatrix} \right] \\ \left[t_4, t_5, \operatorname{sgn}\left(s_{V_{1,4}}^{(0)}\right), \operatorname{sgn}\left(s_{V_{1,4}}^{(1)}\right) \right] &= \left[\frac{4}{5}, 1, \begin{bmatrix} 1 & -1 & -1 & -1 & 1 & 1 & -1 \end{bmatrix}, \begin{bmatrix} 1 & -1 & -1 & -1 & 1 & 1 & -1 \end{bmatrix} \right] \end{aligned}$$

(1)

