

Data used in the Examples  
of the Paper Entitled  
An Algorithm to Parametrize Approximately  
Space Curves  
Journal of Symbolic Computation 56  
(2013) 80–106  
<http://dx.doi.org/10.1016/j.jsc.2013.04.002>  
by  
S. Rueda, J. Sendra, J.R. Sendra

**Example 2.2 (Part-2):** Outputs of Algorithm-1.

$$Q_1(t) = \left[ \frac{-\frac{4961400}{42967} - \frac{650000}{7617817}t + \frac{3056350}{42967}t^2 + \frac{38090385000}{7617817}t^3}{10000 + 5000t^2 - 5000t^4} + \frac{454}{214835}, \right. \\ \left. - \frac{t\left(-\frac{4961400}{42967} - \frac{650000}{7617817}t + \frac{3056350}{42967}t^2 + \frac{38090385000}{7617817}t^3\right)}{10000 + 5000t^2 - 5000t^4} - \frac{65}{7617817} \right]$$

$$Q_{1/2}(t) = \text{NO\_eRATIONAL}$$

$$Q_{1/3}(t) = \left[ \frac{-\frac{9220600}{6468093} - \frac{1970000}{623454003}t + \frac{5680150}{6468093}t^2 + \frac{38496635000}{1870362009}t^3}{\frac{10000}{81} + \frac{5000}{81}t^2 - \frac{5000}{81}t^4} + \frac{675}{319412}, \right. \\ \left. - \frac{t\left(-\frac{9220600}{6468093} - \frac{1970000}{623454003}t + \frac{5680150}{6468093}t^2 + \frac{38496635000}{1870362009}t^3\right)}{\frac{10000}{81} + \frac{5000}{81}t^2 - \frac{5000}{81}t^4} - \frac{197}{7696963} \right]$$

$$Q_{1/4}(t) = \left[ \frac{-\frac{9329825}{20684576} - \frac{141875}{106441344}t + \frac{22989825}{82738304}t^2 + \frac{520016875}{106441344}t^3}{\frac{625}{16} + \frac{625}{32}t^2 - \frac{625}{32}t^4} + \frac{1366}{646393}, \right. \\ \left. - \frac{t\left(-\frac{9329825}{20684576} - \frac{141875}{106441344}t + \frac{22989825}{82738304}t^2 + \frac{520016875}{106441344}t^3\right)}{\frac{625}{16} + \frac{625}{32}t^2 - \frac{625}{32}t^4} - \frac{227}{6652584} \right]$$

$$Q_{1/5}(t) = \left[ \frac{-\frac{7674712}{41540975} - \frac{318}{466043}t + \frac{4727878}{41540975}t^2 + \frac{3731524}{2330215}t^3}{16 + 8t^2 - 8t^4} + \frac{7023}{3323278}, \right. \\ \left. - \frac{t\left(-\frac{7674712}{41540975} - \frac{318}{466043}t + \frac{4727878}{41540975}t^2 + \frac{3731524}{2330215}t^3\right)}{16 + 8t^2 - 8t^4} - \frac{159}{3728344} \right]$$

$$Q_{1/6}(t) = \left[ \frac{-\frac{7676825}{86163426} - \frac{71875}{182053521}t + \frac{18916825}{344653704}t^2 + \frac{4219376875}{6553926756}t^3}{\frac{625}{81} + \frac{625}{162}t^2 - \frac{625}{162}t^4} + \frac{1124}{531873}, \right. \\ \left. - \frac{t\left(-\frac{7676825}{86163426} - \frac{71875}{182053521}t + \frac{18916825}{344653704}t^2 + \frac{4219376875}{6553926756}t^3\right)}{\frac{625}{81} + \frac{625}{162}t^2 - \frac{625}{162}t^4} \right]$$

$$\begin{aligned}
& \left. \frac{t \left( -\frac{7676825}{86163426} - \frac{71875}{182053521} t + \frac{18916825}{344653704} t^2 + \frac{4219376875}{6553926756} t^3 \right) - \frac{345}{6742723}}{\frac{625}{81} + \frac{625}{162} t^2 - \frac{625}{162} t^4} \right] \\
Q_{1/7}(t) &= \left[ -\frac{\frac{17331400}{360382897} - \frac{508000}{2043704789} t + \frac{10676850}{360382897} t^2 + \frac{4263057000}{14305933523} t^3}{\frac{10000}{2401} + \frac{5000}{2401} t^2 - \frac{5000}{2401} t^4} + \right. \\
& \frac{1586}{750485}, \\
& \left. \frac{t \left( -\frac{17331400}{360382897} - \frac{508000}{2043704789} t + \frac{10676850}{360382897} t^2 + \frac{4263057000}{14305933523} t^3 \right) - \frac{254}{4255945}}{\frac{10000}{2401} + \frac{5000}{2401} t^2 - \frac{5000}{2401} t^4} \right] \\
Q_{1/8}(t) &= \left[ -\frac{\frac{9199675}{326342144} - \frac{143125}{859711744} t + \frac{22669675}{1305368576} t^2 + \frac{2103485625}{13755387904} t^3}{\frac{625}{256} + \frac{625}{512} t^2 - \frac{625}{512} t^4} + \right. \\
& \frac{1347}{637387}, \\
& \left. \frac{t \left( -\frac{9199675}{326342144} - \frac{143125}{859711744} t + \frac{22669675}{1305368576} t^2 + \frac{2103485625}{13755387904} t^3 \right) - \frac{229}{3358249}}{\frac{625}{256} + \frac{625}{512} t^2 - \frac{625}{512} t^4} \right] \\
Q_{1/9}(t) &= \left[ -\frac{\frac{10512200}{597320001} - \frac{10070000}{86148088569} t + \frac{6476050}{597320001} t^2 + \frac{65832905000}{775332797121} t^3}{\frac{10000}{6561} + \frac{5000}{6561} t^2 - \frac{5000}{6561} t^4} + \right. \\
& \frac{962}{455205}, \\
& \left. \frac{t \left( -\frac{10512200}{597320001} - \frac{10070000}{86148088569} t + \frac{6476050}{597320001} t^2 + \frac{65832905000}{775332797121} t^3 \right) - \frac{1007}{13130329}}{\frac{10000}{6561} + \frac{5000}{6561} t^2 - \frac{5000}{6561} t^4} \right] \\
Q_{1/10}(t) &= \left[ -\frac{\frac{389557}{33737850} - \frac{110}{1291269} t + \frac{959957}{134951400} t^2 + \frac{1295669}{25825380} t^3}{1 + \frac{1}{2} t^2 - \frac{1}{2} t^4} + \right.
\end{aligned}$$

$$\begin{aligned}
& \frac{1426}{674757'} \\
& \left[ \frac{t \left( -\frac{389557}{33737850} - \frac{110}{1291269} t + \frac{959957}{134951400} t^2 + \frac{1295669}{25825380} t^3 \right) - \frac{110}{1291269}}{1 + \frac{1}{2} t^2 - \frac{1}{2} t^4} \right] \\
Q_{1/11}(t) &= \left[ \frac{-\frac{38490600}{4880621273} - \frac{286250}{4474011421} t + \frac{23712650}{4880621273} t^2 + \frac{1534202500}{49214125631} t^3}{\frac{10000}{14641} + \frac{5000}{14641} t^2 - \frac{5000}{14641} t^4} + \right. \\
& \frac{1409}{666706'} \\
& \left. \frac{t \left( -\frac{38490600}{4880621273} - \frac{286250}{4474011421} t + \frac{23712650}{4880621273} t^2 + \frac{1534202500}{49214125631} t^3 \right) - \frac{229}{2444648}}{\frac{10000}{14641} + \frac{5000}{14641} t^2 - \frac{5000}{14641} t^4} \right] \\
Q_{1/12}(t) &= \left[ \frac{-\frac{26941525}{4838385312} - \frac{246875}{5011387056} t + \frac{66391525}{19353541248} t^2 + \frac{809535625}{40091096448} t^3}{\frac{625}{1296} + \frac{625}{2592} t^2 - \frac{625}{2592} t^4} + \right. \\
& \frac{3945}{1866661'} \\
& \left. \frac{t \left( -\frac{26941525}{4838385312} - \frac{246875}{5011387056} t + \frac{66391525}{19353541248} t^2 + \frac{809535625}{40091096448} t^3 \right) - \frac{395}{3866811}}{\frac{625}{1296} + \frac{625}{2592} t^2 - \frac{625}{2592} t^4} \right] \\
Q_{1/13}(t) &= \left[ \frac{-\frac{17690200}{4375859371} - \frac{2830000}{73068663057} t + \frac{838350}{336604567} t^2 + \frac{12865265000}{949892619741} t^3}{\frac{10000}{28561} + \frac{5000}{28561} t^2 - \frac{5000}{28561} t^4} + \right. \\
& \frac{1619}{766055'} \\
& \left. \frac{t \left( -\frac{17690200}{4375859371} - \frac{2830000}{73068663057} t + \frac{838350}{336604567} t^2 + \frac{12865265000}{949892619741} t^3 \right) - \frac{1619}{766055}}{\frac{10000}{28561} + \frac{5000}{28561} t^2 - \frac{5000}{28561} t^4} \right]
\end{aligned}$$

$$\begin{aligned}
& - \frac{283}{2558337} \Bigg] \\
& \mathcal{Q}_{1/14}(t) = \left[ - \frac{\frac{4223725}{1405300498} - \frac{267500}{8630065563} t + \frac{10408725}{5621201992} t^2 + \frac{2261456875}{241641835764} t^3}{\frac{625}{2401} + \frac{625}{4802} t^2 - \frac{625}{4802} t^4} + \right. \\
& \frac{1237}{585298}, \\
& \left. t \left( - \frac{4223725}{1405300498} - \frac{267500}{8630065563} t + \frac{10408725}{5621201992} t^2 + \frac{2261456875}{241641835764} t^3 \right) \right. \\
& - \frac{\frac{625}{2401} + \frac{625}{4802} t^2 - \frac{625}{4802} t^4}{\frac{625}{2401} + \frac{625}{4802} t^2 - \frac{625}{4802} t^4}} \\
& - \frac{428}{3594363} \Bigg] \\
& \mathcal{Q}_{1/15}(t) = \left[ - \frac{\frac{2292296}{1005082425} - \frac{4256}{168961221} t + \frac{470758}{335027475} t^2 + \frac{16815208}{2534418315} t^3}{\frac{16}{81} + \frac{8}{81} t^2 - \frac{8}{81} t^4} + \right. \\
& \frac{1049}{496337}, \\
& \left. t \left( - \frac{2292296}{1005082425} - \frac{4256}{168961221} t + \frac{470758}{335027475} t^2 + \frac{16815208}{2534418315} t^3 \right) - \frac{266}{2085941} \right] \\
& - \frac{\frac{16}{81} + \frac{8}{81} t^2 - \frac{8}{81} t^4}{\frac{16}{81} + \frac{8}{81} t^2 - \frac{8}{81} t^4}} \\
& \mathcal{Q}_{1/16}(t) = \left[ - \frac{\frac{18416825}{10453590016} - \frac{103125}{4971126784} t + \frac{45386825}{41814360064} t^2 + \frac{382566875}{79538028544} t^3}{\frac{625}{4096} + \frac{625}{8192} t^2 - \frac{625}{8192} t^4} + \right. \\
& \frac{2697}{1276073}, \\
& \left. t \left( - \frac{18416825}{10453590016} - \frac{103125}{4971126784} t + \frac{45386825}{41814360064} t^2 + \frac{382566875}{79538028544} t^3 \right) \right. \\
& - \frac{\frac{625}{4096} + \frac{625}{8192} t^2 - \frac{625}{8192} t^4}{\frac{625}{4096} + \frac{625}{8192} t^2 - \frac{625}{8192} t^4}} \\
& - \frac{165}{1213654} \Bigg]
\end{aligned}$$

$$\begin{aligned}
& \mathcal{Q}_{1/17}(t) = \left[ \frac{-\frac{62275400}{45049306417} - \frac{2020000}{116858991797}t + \frac{38368850}{45049306417}t^2 + \frac{7064465000}{1986602860549}t^3}{\frac{10000}{83521} + \frac{5000}{83521}t^2 - \frac{5000}{83521}t^4} + \right. \\
& \frac{1140}{539377} \\
& \left. t \left( -\frac{62275400}{45049306417} - \frac{2020000}{116858991797}t + \frac{38368850}{45049306417}t^2 + \frac{7064465000}{1986602860549}t^3 \right) \right. \\
& \left. - \frac{202}{1399157} \right] \\
& \mathcal{Q}_{1/18}(t) = \left[ \frac{-\frac{188725}{171593478} - \frac{360625}{24779020554}t + \frac{4186025}{6177365208}t^2 + \frac{1193205625}{446022369972}t^3}{\frac{625}{6561} + \frac{625}{13122}t^2 - \frac{625}{13122}t^4} + \right. \\
& \frac{995}{470764} \\
& \left. t \left( -\frac{188725}{171593478} - \frac{360625}{24779020554}t + \frac{4186025}{6177365208}t^2 + \frac{1193205625}{446022369972}t^3 \right) \right. \\
& \left. - \frac{577}{3776714} \right] \\
& \mathcal{Q}_{1/19}(t) = \left[ \frac{-\frac{32692600}{36902085323} - \frac{702500}{56803926517}t + \frac{20143150}{36902085323}t^2 + \frac{2206080000}{1079274603823}t^3}{\frac{10000}{130321} + \frac{5000}{130321}t^2 - \frac{5000}{130321}t^4} + \right. \\
& \frac{1197}{566326} \\
& \left. t \left( -\frac{32692600}{36902085323} - \frac{702500}{56803926517}t + \frac{20143150}{36902085323}t^2 + \frac{2206080000}{1079274603823}t^3 \right) \right. \\
& \left. - \frac{281}{1743508} \right]
\end{aligned}$$

$$\begin{aligned}
\mathcal{Q}_{1/20}(t) = & \left[ \frac{-\frac{141199}{195679200} - \frac{109}{10286360}t + \frac{347999}{782716800}t^2 + \frac{260647}{164581760}t^3}{\frac{1}{16} + \frac{1}{32}t^2 - \frac{1}{32}t^4} + \right. \\
& \frac{517}{244599}, \\
& \left. - \frac{t\left(-\frac{141199}{195679200} - \frac{109}{10286360}t + \frac{347999}{782716800}t^2 + \frac{260647}{164581760}t^3\right)}{\frac{1}{16} + \frac{1}{32}t^2 - \frac{1}{32}t^4} - \frac{218}{1285795} \right]
\end{aligned}$$

**Example 2.2 (Part-3):** Outputs of Algorithm-Lift.

$$\begin{aligned}
\mathcal{P}_1(t) &= \left[ \frac{-\frac{29347}{1074175} - \frac{130}{7617817}t + \frac{52047}{4296700}t^2 + \frac{7618077}{7617817}t^3 + \frac{454}{214835}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{24807}{1074175}t - \frac{65}{7617817}t^2 + \frac{61127}{4296700}t^3 + \frac{7618012}{7617817}t^4 + \frac{130}{7617817}, \right. \\
&\quad \left. \frac{110741}{8593400}t^3 - \frac{209969}{8593400}t - \frac{65}{7617817}t^2 + \frac{7618142}{7617817} \right] \\
\mathcal{P}_{1/3}(t) &= \left[ \frac{-\frac{109081}{3992650} - \frac{394}{7696963}t + \frac{24182}{1996325}t^2 + \frac{7699327}{23090889}t^3 + \frac{675}{319412}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{46103}{1996325}t - \frac{197}{7696963}t^2 + \frac{113603}{7985300}t^3 + \frac{7698736}{23090889}t^4 + \frac{394}{7696963}, \right. \\
&\quad \left. \frac{617427}{15970600}t^3 - \frac{1170663}{15970600}t - \frac{591}{7696963}t^2 + \frac{7699918}{7696963} \right] \\
\mathcal{P}_{1/4}(t) &= \left[ \frac{-\frac{441493}{16159825} - \frac{227}{3326292}t + \frac{782993}{64639300}t^2 + \frac{832027}{3326292}t^3 + \frac{1366}{646393}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{373193}{16159825}t - \frac{227}{6652584}t^2 + \frac{919593}{64639300}t^3 + \frac{554609}{2217528}t^4 + \frac{227}{3326292}, \right. \\
&\quad \left. \frac{1665979}{32319650}t^3 - \frac{3158751}{32319650}t - \frac{227}{1663146}t^2 + \frac{1664281}{1663146} \right] \\
\mathcal{P}_{1/5}(t) &= \left[ \frac{-\frac{1134914}{41540975} - \frac{159}{1864172}t + \frac{2012789}{166163900}t^2 + \frac{932881}{4660430}t^3 + \frac{7023}{3323278}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{959339}{41540975}t - \frac{159}{3728344}t^2 + \frac{2363939}{166163900}t^3 + \frac{3730729}{18641720}t^4 + \frac{159}{1864172}, \right. \\
&\quad \left. \frac{4282617}{66465560}t^3 - \frac{8119973}{66465560}t - \frac{795}{3728344}t^2 + \frac{3732319}{3728344} \right]
\end{aligned}$$



$$\begin{aligned}
\mathcal{P}_{1/6}(t) &= \left[ \frac{-\frac{121091}{4432275} - \frac{690}{6742723}t + \frac{644273}{53187300}t^2 + \frac{6751003}{40456338}t^3 + \frac{1124}{531873}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{307073}{13296825}t - \frac{345}{6742723}t^2 + \frac{756673}{53187300}t^3 + \frac{6748933}{40456338}t^4 + \frac{690}{6742723}, \right. \\
&\quad \left. \frac{\frac{1370819}{17729100}t^3 - \frac{2599111}{17729100}t - \frac{2070}{6742723}t^2 + \frac{6753073}{6742723}}{-2 - t^2 + t^4} \right] \\
\mathcal{P}_{1/7}(t) &= \left[ \frac{-\frac{102517}{3752425} - \frac{508}{4255945}t + \frac{181817}{15009700}t^2 + \frac{4263057}{29791615}t^3 + \frac{1586}{750485}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{86657}{3752425}t - \frac{254}{4255945}t^2 + \frac{213537}{15009700}t^3 + \frac{4261279}{29791615}t^4 + \frac{508}{4255945}, \right. \\
&\quad \left. \frac{\frac{2707957}{30019400}t^3 - \frac{5134353}{30019400}t - \frac{1778}{4255945}t^2 + \frac{852967}{851189}}{-2 - t^2 + t^4} \right] \\
\mathcal{P}_{1/8}(t) &= \left[ \frac{-\frac{435337}{15934675} - \frac{458}{3358249}t + \frac{772087}{63738700}t^2 + \frac{3365577}{26865992}t^3 + \frac{1347}{637387}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{367987}{15934675}t - \frac{229}{3358249}t^2 + \frac{906787}{63738700}t^3 + \frac{3363745}{26865992}t^4 + \frac{458}{3358249}, \right. \\
&\quad \left. \frac{\frac{1642761}{15934675}t^3 - \frac{3114709}{15934675}t - \frac{1832}{3358249}t^2 + \frac{3367409}{3358249}}{-2 - t^2 + t^4} \right] \\
\mathcal{P}_{1/9}(t) &= \left[ \frac{-\frac{20727}{758675} - \frac{2014}{13130329}t + \frac{110281}{9104100}t^2 + \frac{13166581}{118172961}t^3 + \frac{962}{455205}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{52561}{2276025}t - \frac{1007}{13130329}t^2 + \frac{129521}{9104100}t^3 + \frac{13157518}{118172961}t^4 + \frac{2014}{13130329}, \right. \\
&\quad \left. \frac{\frac{703929}{6069400}t^3 - \frac{1334661}{6069400}t - \frac{9063}{13130329}t^2 + \frac{13175644}{13130329}}{-2 - t^2 + t^4} \right]
\end{aligned}$$

$$\begin{aligned}
\mathcal{P}_{1/10}(t) &= \left[ \frac{-\frac{153619}{5622975} - \frac{220}{1291269}t + \frac{817357}{67475700}t^2 + \frac{1295669}{12912690}t^3 + \frac{1426}{674757}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{389557}{16868925}t - \frac{110}{1291269}t^2 + \frac{959957}{67475700}t^3 + \frac{431523}{4304230}t^4 + \frac{220}{1291269}, \right. \\
&\quad \left. \frac{1739071}{13495140}t^3 - \frac{3297299}{13495140}t - \frac{1100}{1291269}t^2 + \frac{1296769}{1291269} \right] \\
\mathcal{P}_{1/11}(t) &= \left[ \frac{-\frac{227678}{8333825} - \frac{229}{1222324}t + \frac{403803}{33335300}t^2 + \frac{613681}{6722782}t^3 + \frac{1409}{666706}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{192453}{8333825}t - \frac{229}{2444648}t^2 + \frac{474253}{33335300}t^3 + \frac{2452205}{26891128}t^4 + \frac{229}{1222324}, \right. \\
&\quad \left. \frac{9450749}{66670600}t^3 - \frac{17918681}{66670600}t - \frac{2519}{2444648}t^2 + \frac{2457243}{2444648} \right] \\
\mathcal{P}_{1/12}(t) &= \left[ \frac{-\frac{1274911}{46666525} - \frac{790}{3866811}t + \frac{2261161}{186666100}t^2 + \frac{1295257}{15467244}t^3 + \frac{3945}{1866661}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{1077661}{46666525}t - \frac{395}{3866811}t^2 + \frac{2655661}{186666100}t^3 + \frac{1293677}{15467244}t^4 + \frac{790}{3866811}, \right. \\
&\quad \left. \frac{14432949}{93333050}t^3 - \frac{27364881}{93333050}t - \frac{1580}{1288937}t^2 + \frac{1296837}{1288937} \right] \\
\mathcal{P}_{1/13}(t) &= \left[ \frac{-\frac{104641}{3830275} - \frac{566}{2558337}t + \frac{185591}{15321100}t^2 + \frac{2573053}{33258381}t^3 + \frac{1619}{766055}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{88451}{3830275}t - \frac{283}{2558337}t^2 + \frac{217971}{15321100}t^3 + \frac{856458}{11086127}t^4 + \frac{566}{2558337}, \right. \\
&\quad \left. \frac{5133349}{30642200}t^3 - \frac{9732801}{30642200}t - \frac{3679}{2558337}t^2 + \frac{2576732}{2558337} \right]
\end{aligned}$$

$$\begin{aligned}
\mathcal{P}_{1/14}(t) &= \left[ \frac{-\frac{199874}{7316225} - \frac{856}{3594363}t + \frac{354499}{29264900}t^2 + \frac{3618331}{50321082}t^3 + \frac{1237}{585298}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{168949}{7316225}t - \frac{428}{3594363}t^2 + \frac{416349}{29264900}t^3 + \frac{1204113}{16773694}t^4 + \frac{856}{3594363}, \right. \\
&\quad \left. \frac{754247}{4180700}t^3 - \frac{1430043}{4180700}t - \frac{5992}{3594363}t^2 + \frac{3624323}{3594363} \right] \\
\mathcal{P}_{1/15}(t) &= \left[ \frac{-\frac{338987}{12408425} - \frac{532}{2085941}t + \frac{601237}{49633700}t^2 + \frac{2101901}{31289115}t^3 + \frac{1049}{496337}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{286537}{12408425}t - \frac{266}{2085941}t^2 + \frac{706137}{49633700}t^3 + \frac{2097911}{31289115}t^4 + \frac{532}{2085941}, \right. \\
&\quad \left. \frac{3837633}{19853480}t^3 - \frac{7276077}{19853480}t - \frac{3990}{2085941}t^2 + \frac{2105891}{2085941} \right] \\
\mathcal{P}_{1/16}(t) &= \left[ \frac{-\frac{871523}{31901825} - \frac{165}{606827}t + \frac{1545773}{127607300}t^2 + \frac{612107}{9709232}t^3 + \frac{2697}{1276073}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{736673}{31901825}t - \frac{165}{1213654}t^2 + \frac{1815473}{127607300}t^3 + \frac{610787}{9709232}t^4 + \frac{165}{606827}, \right. \\
&\quad \left. \frac{6577638}{31901825}t^3 - \frac{12471022}{31901825}t - \frac{1320}{606827}t^2 + \frac{613427}{606827} \right] \\
\mathcal{P}_{1/17}(t) &= \left[ \frac{-\frac{368377}{13484425} - \frac{404}{1399157}t + \frac{653377}{53937700}t^2 + \frac{1412893}{23785669}t^3 + \frac{1140}{539377}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{311377}{13484425}t - \frac{202}{1399157}t^2 + \frac{767377}{53937700}t^3 + \frac{1409459}{23785669}t^4 + \frac{404}{1399157}, \right. \\
&\quad \left. \frac{23632227}{107875400}t^3 - \frac{44805863}{107875400}t - \frac{3434}{1399157}t^2 + \frac{1416327}{1399157} \right]
\end{aligned}$$

$$\begin{aligned}
\mathcal{P}_{1/18}(t) &= \left[ \frac{-\frac{160757}{5884550} - \frac{577}{1888357}t + \frac{71283}{5884550}t^2 + \frac{1909129}{33990426}t^3 + \frac{995}{470764}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{67941}{2942275}t - \frac{577}{3776714}t^2 + \frac{167441}{11769100}t^3 + \frac{951968}{16995213}t^4 + \frac{577}{1888357}, \right. \\
&\quad \left. \frac{2729907}{11769100}t^3 - \frac{5175783}{11769100}t - \frac{5193}{1888357}t^2 + \frac{1914322}{1888357} \right] \\
\mathcal{P}_{1/19}(t) &= \left[ \frac{-\frac{193388}{7079075} - \frac{281}{871754}t + \frac{343013}{28316300}t^2 + \frac{441216}{8281663}t^3 + \frac{1197}{566326}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{163463}{7079075}t - \frac{281}{1743508}t^2 + \frac{402863}{28316300}t^3 + \frac{1759525}{33126652}t^4 + \frac{281}{871754}, \right. \\
&\quad \left. \frac{13865991}{56632600}t^3 - \frac{26289179}{56632600}t - \frac{5339}{1743508}t^2 + \frac{1770203}{1743508} \right] \\
\mathcal{P}_{1/20}(t) &= \left[ \frac{-\frac{55683}{2038325} - \frac{436}{1285795}t + \frac{296299}{24459900}t^2 + \frac{260647}{5143180}t^3 + \frac{517}{244599}t^4}{-2 - t^2 + t^4}, \right. \\
&\quad \left. -\frac{141199}{6114975}t - \frac{218}{1285795}t^2 + \frac{347999}{24459900}t^3 + \frac{51955}{1028636}t^4 + \frac{436}{1285795}, \right. \\
&\quad \left. \frac{630397}{2445990}t^3 - \frac{1195193}{2445990}t - \frac{872}{257159}t^2 + \frac{261519}{257159} \right]
\end{aligned}$$

### Example 5.3

$$F_1 = -\frac{718945312497}{100}x + \frac{698623125001}{100}y - 671015625z + 13865578693zy \\ - 12118499950zx + 24392628607xy - 18401807886y^2 - 1311877532z^2$$

$$F_2 = -\frac{431020499999}{25}x + \frac{1675347948801}{100}y - 1609143200z + 4365980240zy \\ - 401217042zx - 24936051360y^2 - 683547137z^2 + 24392628607x^2$$

$$f(x, y) = 519214794208190771821271348690xy \\ - 22144206574475105245447437500y \\ - 50593506781136499854115750000x \\ - 263699068403162953155746536273x^2 \\ - 3506554787350441454937037630370669570532400x^2y \\ + 2001041491196875447022451340646311476120000y^4 \\ - 1375243687982284440133874556317815763017900y^3 \\ + 1181135403984285691699652358099519905539600x^3 \\ + 3822854018379971568005990028139750906437600xy^2 \\ - 23150253918103042359735730833456610326425y^2 \\ - 2990857566280233519223017006583003391920000xy^3 \\ - 1221346211185757473708400431591899962200000x^2y^2 \\ + 3915698980584388572930982565824501153840000x^3y \\ - 1812915331110811781009743891320609497320000x^4.$$

$$\begin{aligned}
p_1(t) &= \frac{28775}{134878}t^4 - \frac{645133685412359023344138179412317}{4461866265407943435243199839932400}t^3 \\
&\quad - \frac{47828026434221466944680145374491240124}{56419462326158680749256153875975210675}t^2 \\
&\quad + \frac{10298677641229167982949337521716055081}{8792643479401352844039920084567565300}t \\
&\quad - \frac{282564785776255216958896195015606102373}{677033547913904168991073846511702528100} \\
p_2(t) &= -\frac{2160066846340}{11464617073833} + \frac{2529318097870854779519283971815727}{13830842023940351964026758319783100}t \\
&\quad + \frac{60631257463078784542819156925667898391}{96719078273414881284439120930243218300}t^2 \\
&\quad - \frac{348110489497318842899696017229625239119}{338516773956952084495536923255851264050}t^3 \\
&\quad + \frac{2255273376802449185664003707419257487}{5900074491624437202536591255003943600}t^4 \\
q(t) &= -\frac{212187313}{234205983} + \frac{458301406}{234205983}t - \frac{142948855}{234205983}t^2 - \frac{350056078}{234205983}t^3 + t^4.
\end{aligned}$$

$$\begin{aligned}
p_3(t) = & -\frac{1248425652933171182782225268808987890080426987}{4484675366836665361068557491454751035073613560} \\
& -\frac{1610547321878471927524238023039081161718548457}{2242337683418332680534278745727375517536806780}t \\
& +\frac{3654698260432806341587043441984072231147356091}{1868614736181943900445232288106146264614005650}t^2 \\
& -\frac{15952846667440940986442428354469281420281211399}{14948917889455551203561858304849170116912045200}t^3
\end{aligned}$$

### Example 5.4

$$F_1 = 20052827033xy + 2850904342zy - 7155364672zx - \frac{215763180597}{100}x - 7869010116z + \frac{1743412651801}{100}y - 43102722226y^2 + 1610946062z^2$$

$$F_2 = -18330943984zy + 33857630124zx - \frac{390188402999}{2}x - 56921602320z + \frac{12611223036001}{100}y - 166608514760y^2 + 57179742076z^2 + 20052827033x^2$$

$$\begin{aligned} f(x, z) = & 695983207231904953587955990428267924213065567600 \, zx - \\ & 4075715386865119049049487616482814867 \, x - \\ & 620786677104677591019084153503353200 \, z + \\ & 176962361897509370818320465169999817087069290000 \, x^3 + \\ & 95417052610957590911651874245827704204649429300 \, x^2 + \\ & 1269145848468213919537581851401398610910030826200 \, z^2 + \\ & 807756138987159034397480378300764327723104000000 \, x^3z - \\ & 1355904240512625682326277324468779978074601900000 \, x^2z - \\ & 2573514563455988113608385023300351210923699280000 \, z^3 + \\ & 2289865007986656329820887550444941109017568000000 \, z^4 - \\ & 3292700550273151781477859564379552642558952040000 \, z^2x + \\ & 4798217962491616791707627553145549877824128000000 \, xz^3 + \\ & 3090311649113686181364338128367849480772240000000 \, x^2z^2 - \\ & 298194466609627767569570470711156872650178000000 \, x^4 \end{aligned}$$



$$\begin{aligned}
p_1(t) = & \frac{1}{\alpha_1} (1304559081946438324042436697338607686109624368047191927128812912 \\
& 26502580522345582106624730379444654637069131821969239578288 \\
& 64000557046645004425579353960411708279471353734640399853399 \\
& 10085203377816597013566055694048759216994714376697867910994 \\
& 58914183789232763526142396814369803274234215888516950802982 \\
& 00491377483609901413005515299009080480705074655176626201938 \\
& 043906558406049427246011362731426856898127552249559312377 t - \\
& 29950713142947914017142198166563078739043577980221102304133 \\
& 76486456702008041877827220363794466568079523560814508464648 \\
& 35011971575964065428702741526800117459552865354516279146403 \\
& 35421750974832983948041004492727038542043946909644872213675 \\
& 43921925513210421691835505782164836428704050920173682260257 \\
& 88976440792126978091475767774263290870335472856623980200673 \\
& 91014486257394695945699301632930892377471653266560187355128 \\
& 137 t^2 - 20960399499097757033029519128835404514170899175205807 \\
& 70061970783197983660508035059183330522068735188254961507494 \\
& 92978791014170490714096627906758813063580379686147501727624 \\
& 26268631876498609158026154424312802797248122729033146725326 \\
& 54263629880820371653934886047158954539240541064012849997772 \\
& 96417745096464205759891592754582937728204173349066876659040 \\
& 10165194439134111447545874544365373192155740949521391687075 \\
& 14106822 - 1114733278596352224158965144009828990627800709147 \\
& 29926716935990310963305044140580585569156473846054952273287 \\
& 92983770058146752969473406372235651237508799246972877065439 \\
& 87183176497240004754344853750590723057451103993515993036033 \\
& 10735947169925635416939374738994657243267277120296338686977 \\
& 38413688473505119896540831769422667870790609164798894193793 \\
& 44886550552282836101522427465501570540789696058340183573745 \\
& 7294976803041 t^4
\end{aligned}$$

– 3005548231598623947431638257527300536884087  
 28747147678020340891488506599681689060007017977527273241277  
 75780742635433841573940991092414898554602925711635331388050  
 67015019892009041761231565194987669979253617513026030784202  
 77608738482734387333263364164272498495129631785475622504296  
 91098913251489887386943972701844046604828414528716158881549  
 33698829530445292763555204302116354418201764632148233959433  
 5200465441740555263  $t^3$ )

$\alpha_1 =$  15542065010694243284960764722382459279597217331924236416436145725  
 85797178790524848255526272315646932711842145364155287215114  
 30118865192693760147226648541576776577145829866293642124455  
 70433231131702551507521553213528939631595170554793511317383  
 69728744641429752101131720918461057244344846174421892847492  
 07094790583435755450430343043789810930488355548093732503467  
 00401735971659465258184481334231183831058885688057481400

$p_2(t) = \frac{1}{\alpha_2}$  (24496301117191693867864477947963909180418110711628813630643132295  
 46209938384466525633154575259253324376057874597174725616638  
 05904977536946208716487816842888549098090981807163091992583  
 20607753278522680402165390310504985670980259546598715902686  
 09212038752210241355332909217220207098530492721501989994666  
 91355788067358090875590939430858813872648585077179054736052  
 83079386326625034205323170376633826394007868100841893712184  
 29202279543127446356225319891916365029216993823591321821452  
 02390248133123474967865133105123813252217703289877174534910  
 06304114812394523137315913182328384720502598224118701222306  
 57306066491824111915951901005012958607182272658412039631715  
 2950536439108452285778351926239221154818200  $t + 3429078077114$

20763931319594715106612571199606210863726270280068523482971  
11228994152526601296784637776402155779834678735861936242000  
62445707580075693298664302466843598010630377866207844191788  
52006577200662146066123351601461975987125239805294070112582  
10253189044492286380232490684846826266671373120690765061793  
04582710010869252379635952627539504290990102074077154836996  
38222553384884548807179262121307522408578470242460298890286  
90644144233082607131602221515559233685395248776555262480771  
82002968108257097476642528196573135399741003891778673207222  
16250055131432205570918077762132756258391001675055446909036  
12066694413610254983824622294146156137051385629403961618914  
072536158276279690496705809809841505  $t^2 + 58674892610235014843$   
10900978738139897732708962838371321650700537274903885987190  
40972101072682478104548823576225744300467387354219289424622  
44378928163282671180439520649603006726547832829999698606346  
96236661663014844608242491386384963593263549643489411275868  
81629968625641273526557956665904959996680441778970756423343  
02887721142889310874588513607404417885644614695112628270925  
33201895862611198111363335382372059200323110890767948588458  
98931888913332557738011896356016135122150324497409429522822  
41866414966673127625661566702279399193294067342957299737363  
62094731013368888873852457124035798563823670554949410929674  
84727559974848546053140359237515760435019301103145724775662  
9878853864673813830519533656 + 16049293105850442525245013903

22869712560370203242154371666630254321078956588642326034662  
18713464880264009337675729433531173388757163362530507782671  
98075758825089439066028992803362480693357791143465517982450  
16464689197858175638291325740707234458483606358229971738551  
49522499481137333882239583086655754187653985261014021106402  
96144975393645075127584006446645321801670282334334505762062  
28013911649694209683021561949565381751471195513534311594976  
77512545023502438979164071522259239507529245042859929933702  
80313432279719840342045623172023525831365707090905225029296  
05111306756239959745752191225506338431444614131449582677424  
19998713862123612620762387122073970585482463961979468924283  
92559996000271804251  $t^3$ )

$\alpha_2 =$  79310899175367597434575827104926329838803928436595629244144954017  
72428052294987842502480342389352596109009912482317433609444  
67936265783765349681522793101368187774750336806351122145739  
02880022326673845134973796096571738242390173435892127893669  
79919648402541631127064127755428207903075464265698809873288  
85163578457602708703163694162883640368039077658825758720107  
83614585841023837214978998728642473947838467064631711921201  
18707737390891170291742328554701733675621690248013625138684  
77856538644520782065623555315094166493238365902933923230292  
87268388144283527662788406513820715383415567654027799484924  
57396757834011344035280359802720681765512418085594991212071  
3328268356399221092354062929731063456071700

$$\begin{aligned}
p_3(t) = & \frac{1}{\alpha_3} (62387588521000894265746966098514248003406414899292183747003641170 \\
& 54806526511870653832344710018213918424700047058400479538104 \\
& 61631911119813305720079899991980463918416583714566760648838 \\
& 88676306951423527712581957000933386085197901277048668087578 \\
& 03805320185668231158552881722253985443198831468412325486639 \\
& 11931896331241170588412370467152422105482079733568316620081 \\
& 48225043788741330904977310120587099029346701247566385522999 t - \\
& 59378097844886614671286852846997005096608368746040760109956 \\
& 56246546205400517165957730991727148591178124071040561196298 \\
& 43118652827143098556940921208104539681960211040836566572190 \\
& 80675564552630437759316426855059175269156153964182736017923 \\
& 97851956335474564996467607641547012792206429443300859364764 \\
& 44027446006799555596516911223435779610707989257020736386479 \\
& 28997153278129820192345466974026481447619523926203976536312 \\
& 4566519 t^3 + 3175932540567387459690222462641876800264368240038 \\
& 01208976540722616038209472857286066757855542103295001854707 \\
& 86283413339192405693110251620164504908680196700475010218842 \\
& 08297921056655273041709755649382947527876832726473421666151 \\
& 11161443423218739987435386054259643775219037770122363270856 \\
& 67150020144393247473859947708263146113985226037936363560038 \\
& 17032182719226423459162580257476279571112446244274096612862 \\
& 8165406234458084 - 36187364993754091652068464860654384910101 \\
& 43619419741894934510540935883715332939702372093404504778381 \\
& 76058213366712843260566387331093771256972776557662065314419 \\
& 56571433551676006168881601301413975255129388614883272370404 \\
& 11650622369853730736761898509956016939911704111101158350635 \\
& 66995213596756711899847391035197804523576850037063187674433 \\
& 00213063363950070180157626620864127678801810854306919882796 \\
& 7998499145215547799215767t^4 - 2083861701413982351263992321323
\end{aligned}$$

02858230211507704731887484598338393470421762124699285841490  
99057734028878050768449392235537572237707637267439911434614  
84071009307917839167148095421404450210409315797527331433286  
66407370833815337972752534505763743192094857103664605630240  
40201083426978859619189676618809018307632327996423467434942  
53109853675275955141044628729629678734866104074765176874949  
67324897595504714987409745807407973  $t^2$ )

$\alpha_3 =$  68081028707914235421923735391160730065961230013216792251764949866  
92280565225981991029148360223582716885942932119333910565864  
14801914816823623170714678759960993298740654505954843308487  
18642737946728402862009179048297696137851300577305611242171  
23439715840332172188331202552190834154908910500906497341367  
62798241177102283415948398919095294446584494620175733387510  
29351661216943481747986743515184114289558060223946701586748  
00

$$\begin{aligned}
q(t) = & \frac{1}{\alpha} (2282542302561621575765607352636234726402831441767817931 \\
& 5462918265011391657453997207233055973419424772897291520836936994390063326 \\
& 81706367959779110805044220689717786574531264127492297148486234903755505651 \\
& 72189555823348187379180626434978938245005170699041872268833351338472216946 \\
& 39062463049492377071335558239132423133320093542767875599737841417952956603 \\
& 93725723148979708837641695168320 t^3 + \\
& 64200242025405209387378301486638335166994107617036114110514256782862020886 \\
& 43923520599863563422973836224544315861008454092404023381940249747868205658 \\
& 28937929334533477632513695015190875500443570684179351361650045937558086712 \\
& 85133538368070684863829448289906911919219997144792313078617608919676225596 \\
& 76162365824759681275906606453694766378380450640989225318375635969940200820 \\
& 73516014013 t^4 + \\
& 29678685825831144347328089007270430889263289987216847976221392401715065894 \\
& 24411782001009447937870443334952804479989566617227058165296725763044466573 \\
& 83919471692793037038841550723931359614954007828791694478061827936435041838 \\
& 36957529170916219636764610402532707562665058280893551223641717145006994453 \\
& 46807172762433014837906661126890905103821291588301143168186085422164199548 \\
& 379175153342 t^2 + 1685550436970722419546303414906747781245092544327871 \\
& 25207225668088870069289180890330840029631084963428972370646904427741513750 \\
& 50577246802520559210691831932537934244747766648251426299234674152245300010 \\
& 94382862607229953480403807701850266385328313201109763756604999755092277101 \\
& 48953997109179320087860182523490993243430110020444447213040748519050038536 \\
& 5545508896967235395389100604048640 t + \\
& 35497794554454595549655031753084705090767957633835958937510024491743965733 \\
& 97321408863227346093726711385409504026529956160596353980182640732231175030 \\
& 72224340911544331342155215720475037080632643834651188774080667137286746918 \\
& 87116281473498280107843217472159304533934608184715296899693123911114573150 \\
& 49144843753774104344604708451168114323153251548649256897024874128428159408 \\
& 26381160437)
\end{aligned}$$

$\alpha =$  642002420254052093873783014866383351669941076170361141105142567  
82862020886439235205998635634229738362245443158610084540924040233819402497478  
68205658289379293345334776325136950151908755004435706841793513616500459375580  
86712851335383680706848638294482899069119192199971447923130786176089196762255  
96761623658247596812759066064536947663783804506409892253183756359699402008207  
3516014013