Comparison between HypervanHoeij (Maxima) & FPS [rectohyperterm] (Maple) and LREtools[hypergeomsols] (Maple)

Hypergeometric term solutions in Maple

The examples are taken from
https://www.math.fsu.edu/~hoeij/comparison_hypergeomsols

```
> restart
> read "vanHoeijREs.mpl"
> with(CodeTools):
> CPUTime(LREtools[hypergeomsols](RE[1]=0,v(n),{},output=basis))
```

$$0.235, \left[\left(-\frac{1}{a-1}\right)^n, \left(-\frac{1}{a-1}\right)^n n\right] \tag{1}$$

```
> CPUTime(FPS[rectohyperterm](RE[1]=0,v(n),C))
```

$$0.141, \left\{\left(-\frac{1}{a-1}\right)^n, \left(-\frac{1}{a-1}\right)^n n\right\} \tag{2}$$

```
> CPUTime(LREtools[hypergeomsols](RE[2]=0,v(n),{},output=basis))
```

$$0.078, \left[\frac{\left(-\frac{1}{a}\right)^n \Gamma\left(n+\frac{1}{2}\right)}{\Gamma(n+1)}\right] \tag{3}$$

```
> CPUTime(FPS[rectohyperterm](RE[2]=0,v(n),C))
```

$$0.141, \left\{\frac{\left(-\frac{1}{a}\right)^n (2n)!\, 4^{-n}}{n!^2}\right\} \tag{4}$$

```
> CPUTime(LREtools[hypergeomsols](RE[3]=0,v(n),{},output=basis))
```

$$0.,\left[\frac{\left(-\frac{1}{-3+a}\right)^n}{n}\right] \tag{5}$$

```
> CPUTime(FPS[rectohyperterm](RE[3]=0,v(n),C))
```

$$0.,\left\{\frac{\left(-\frac{1}{-3+a}\right)^n}{n}\right\} \tag{6}$$

```
> CPUTime(LREtools[hypergeomsols](RE[4]=0,v(n),{},output=basis))
```

$$0.156,\left[\frac{\left(-\frac{1}{a}\right)^n \Gamma\left(n+\frac{1}{2}\right)}{\Gamma(n+1)}\right] \tag{7}$$

```
> CPUTime(FPS[rectohyperterm](RE[4]=0,v(n),C))
```

$$0.078,\left\{\frac{\left(-\frac{1}{a}\right)^n (2n)!\,4^{-n}}{n!^2}\right\} \tag{8}$$

```
> CPUTime(LREtools[hypergeomsols](RE[5]=0,v(n),{},output=basis))
```

$$0.,\left[\left(-\frac{1}{a}\right)^n,\left(-\frac{3}{3a-1}\right)^n,\left(-\frac{3}{3a-1}\right)^n n\right] \tag{9}$$

```
> CPUTime(FPS[rectohyperterm](RE[5]=0,v(n),C))
```

$$0.063,\left\{\left(-\frac{1}{a}\right)^n,\left(-\frac{3}{3a-1}\right)^n,\left(-\frac{3}{3a-1}\right)^n n\right\} \tag{10}$$

```
> CPUTime(LREtools[hypergeomsols](RE[6]=0,v(n),{},output=basis))
```

$$0.031,\left[\frac{\left(-\frac{1}{a}\right)^n \left(2a^2-2an+n^2+4a-3n+2\right)}{n(n-1)(n-2)},\frac{\left(-\frac{1}{a+1}\right)^n}{n(n-1)(n-2)}\right] \tag{11}$$

```
> CPUTime(FPS[rectohyperterm](RE[6]=0,v(n),C))
```

$$0.047,\left\{\frac{\left(-\frac{1}{a+1}\right)^n}{n(n-1)(n-2)},\frac{\left(-\frac{1}{a}\right)^n \left(2a^2-2an+n^2+4a-3n+2\right)}{n(n-1)(n-2)}\right\} \tag{12}$$

```
> CPUTime(LREtools[hypergeomsols](RE[7]=0,v(n),{},output=basis))
```

$$0.062,\left[\left(-\frac{1}{a}\right)^n (3a+n+1)\right] \tag{13}$$

```
> CPUTime(FPS[rectohyperterm](RE[7]=0,v(n),C))
```

$$0.063,\left\{\left(-\frac{1}{a}\right)^n (3a+n+1)\right\} \tag{14}$$

```
> CPUTime(LREtools[hypergeomsols](RE[8]=0,v(n),{},output=basis))
```

$$0.046,\left[\left(-\frac{1}{a+1}\right)^n\right] \tag{15}$$

```
> CPUTime(FPS[rectohyperterm](RE[8]=0,v(n),C))
```

$$0.032,\left\{\left(-\frac{1}{a+1}\right)^n\right\} \tag{16}$$

```
> CPUTime(LREtools[hypergeomsols](RE[9]=0,v(n),{},output=basis))
```

(17)

$$0.109,\ 0 \tag{17}$$

```
> CPUTime(FPS[rectohyperterm](RE[9]=0,v(n),C))
```

$$0.016,\ \varnothing \tag{18}$$

```
> CPUTime(LREtools[hypergeomsols](RE[10]=0,v(n),{},output=basis))
```

$$0.172,\ \left[\left(-\frac{1}{a}\right)^{n}(n+4)\,(n+3)\,(n+2)\,(n+1),\ \left(-\frac{1}{a-1}\right)^{n}(n+4)\,(n+3)\,(n+2)\,(n+1)\,(a-n-6)\right] \tag{19}$$

```
> CPUTime(FPS[rectohyperterm](RE[10]=0,v(n),C))
```

$$0.031,\ \left\{\left(-\frac{1}{a}\right)^{n}(n+4)\,(n+3)\,(n+2)\,(n+1),\ \left(-\frac{1}{a-1}\right)^{n}(n+4)\,(n+3)\,(n+2)\,(n+1)\,(a-n-6)\right\} \tag{20}$$

```
> CPUTime(LREtools[hypergeomsols](RE[11]=0,v(n),{},output=basis))
```

$$0.,\ 0 \tag{21}$$

```
> CPUTime(FPS[rectohyperterm](RE[11]=0,v(n),C))
```

$$0.,\ \varnothing \tag{22}$$

```
> CPUTime(LREtools[hypergeomsols](RE[12]=0,v(n),{},output=basis))
```

$$0.157,\ \left[\frac{(-\mathrm{I})^{n}}{\Gamma(n+1)},\ \frac{\mathrm{I}^{n}}{\Gamma(n+1)}\right] \tag{23}$$

```
> CPUTime(FPS[rectohyperterm](RE[12]=0,v(n),C))
```

$$0.156,\ \left\{\frac{RootOf(\_Z^{2}+1)^{n}}{n!}\right\} \tag{24}$$

```
> CPUTime(LREtools[hypergeomsols](RE[13]=0,v(n),{},output=basis))
```

$$0.047,\ \left[\frac{\left(-\frac{1}{a}\right)^{n}(3a-n+3)}{n\,(n-1)\,(n-2)\,(n-3)},\ \frac{\left(-\frac{3}{2+3a}\right)^{n}(3a+n-1)}{n\,(n-1)\,(n-2)\,(n-3)}\right] \tag{25}$$

```
> CPUTime(FPS[rectohyperterm](RE[13]=0,v(n),C))
```

$$0.062,\ \left\{\frac{\left(-\frac{3}{2+3a}\right)^{n}(3a+n-1)}{n\,(n-1)\,(n-2)\,(n-3)},\ \frac{(n-3a-3)\left(-\frac{1}{a}\right)^{n}}{n\,(n-1)\,(n-2)\,(n-3)}\right\} \tag{26}$$

```
> CPUTime(LREtools[hypergeomsols](RE[14]=0,v(n),{},output=basis))
```

$$0.016,\ \left[\left(-\frac{1}{a-1}\right)^{n}\right] \tag{27}$$

```
> CPUTime(FPS[rectohyperterm](RE[14]=0,v(n),C))
```

$$0.031,\ \left\{\left(-\frac{1}{a-1}\right)^{n}\right\} \tag{28}$$

```
> CPUTime(LREtools[hypergeomsols](RE[15]=0,v(n),{},output=basis))
```

$$0.406,\ \left[\left(-\frac{1}{a+1}\right)^{n},\ \left(-\frac{1}{a-1}\right)^{n},\ \left(-\frac{1}{a+\mathrm{I}}\right)^{n},\ \left(-\frac{1}{a-\mathrm{I}}\right)^{n}\right] \tag{29}$$

```
> CPUTime(FPS[rectohyperterm](RE[15]=0,v(n),C))
```

(30)

$$0.250,\ \left\{\left(-\frac{1}{a-1}\right)^n,\ \left(-\frac{1}{a+1}\right)^n,\ RootOf\left(1+\left(a^2+1\right)\_Z^2+2\,\_Z a\right)^n\right\} \tag{30}$$

```
> CPUTime(LREtools[hypergeomsols](RE[16]=0,v(n),{},output=basis))
```

$$0.078,\ 0 \tag{31}$$

```
> CPUTime(FPS[rectohyperterm](RE[16]=0,v(n),C))
```

$$0.156,\ \varnothing \tag{32}$$

```
> CPUTime(LREtools[hypergeomsols](RE[17]=0,v(n),{},output=basis))
```

$$0.016,\ 0 \tag{33}$$

```
> CPUTime(FPS[rectohyperterm](RE[17]=0,v(n),C))
```

$$0.031,\ \varnothing \tag{34}$$

```
> CPUTime(LREtools[hypergeomsols](RE[18]=0,v(n),{},output=basis))
```

$$0.016,\ 0 \tag{35}$$

```
> CPUTime(FPS[rectohyperterm](RE[18]=0,v(n),C))
```

$$0.047,\ \varnothing \tag{36}$$

```
> CPUTime(LREtools[hypergeomsols](RE[19]=0,v(n),{},output=basis))
```

$$0.094,\ \left[\frac{\left(-\frac{1}{a}\right)^n}{n\,(n-1)},\ \left(-\frac{1}{a}\right)^n\right] \tag{37}$$

```
> CPUTime(FPS[rectohyperterm](RE[19]=0,v(n),C))
```

$$0.093,\ \left\{\left(-\frac{1}{a}\right)^n,\ \frac{\left(-\frac{1}{a}\right)^n}{n\,(n-1)}\right\} \tag{38}$$

```
> CPUTime(LREtools[hypergeomsols](RE[20]=0,v(n),{},output=basis))
```

$$0.078,\ \left[\frac{\left(-\frac{1}{a}\right)^n}{n\,(n-1)\,(n-2)\,(n-3)\,(n-4)}\right] \tag{39}$$

```
> CPUTime(FPS[rectohyperterm](RE[20]=0,v(n),C))
```

$$0.110,\ \left\{\frac{\left(-\frac{1}{a}\right)^n}{n\,(n-1)\,(n-2)\,(n-3)\,(n-4)}\right\} \tag{40}$$

```
> CPUTime(LREtools[hypergeomsols](RE[21]=0,v(n),{},output=basis))
```

$$0.016,\ \left[\left(-\frac{1}{a}\right)^n,\ \left(-\frac{1}{a}\right)^n n,\ \left(-\frac{1}{a-1}\right)^n,\ \left(-\frac{2}{2\,a+1}\right)^n\right] \tag{41}$$

```
> CPUTime(FPS[rectohyperterm](RE[21]=0,v(n),C))
```

$$0.203,\ \left\{\left(-\frac{1}{a}\right)^n,\ \left(-\frac{1}{a-1}\right)^n,\ \left(-\frac{2}{2\,a+1}\right)^n,\ \left(-\frac{1}{a}\right)^n n\right\} \tag{42}$$

```
> CPUTime(LREtools[hypergeomsols](RE[22]=0,v(n),{},output=basis))
```

$$0.,\ 0 \tag{43}$$

```
> CPUTime(FPS[rectohyperterm](RE[22]=0,v(n),C))
```

$$0.,\ \varnothing \tag{44}$$

```
> CPUTime(LREtools[hypergeomsols](RE[23]=0,v(n),{},output=basis))
```

$$0.063,\ \left[\frac{(-\mathrm{I})^n}{\Gamma(n+1)},\ \frac{\mathrm{I}^n}{\Gamma(n+1)}\right] \tag{45}$$

```
> CPUTime(FPS[rectohyperterm](RE[23]=0,v(n),C))
```

$$0.078,\ \left\{\frac{RootOf\left(\_Z^2+1\right)^n}{n!}\right\} \tag{46}$$

```
> CPUTime(LREtools[hypergeomsols](RE[24]=0,v(n),{},output=basis))
```

$$0.047,\ \left[\frac{(-1)^n}{\Gamma(n+1)},\ \frac{1}{\Gamma(n+1)}\right] \tag{47}$$

```
> CPUTime(FPS[rectohyperterm](RE[24]=0,v(n),C))
```

$$0.078,\ \left\{\frac{1}{n!},\ \frac{(-1)^n}{n!}\right\} \tag{48}$$

```
> CPUTime(LREtools[hypergeomsols](RE[25]=0,v(n),{},output=basis))
```

$$0.031,\ 0 \tag{49}$$

```
> CPUTime(FPS[rectohyperterm](RE[25]=0,v(n),C))
```

$$0.016,\ \varnothing \tag{50}$$

```
> CPUTime(LREtools[hypergeomsols](RE[26]=0,v(n),{},output=basis))
```

$$0.156,\ \left[\frac{(-1)^n}{\Gamma(n+1)},\ \frac{1}{\Gamma(n+1)},\ \frac{n}{\Gamma(n+1)},\ \frac{\mathrm{I}^n}{\Gamma(n+1)},\ \frac{(-\mathrm{I})^n}{\Gamma(n+1)},\ \frac{\left(-\frac{1}{2}+\frac{\mathrm{I}\sqrt{3}}{2}\right)^n}{\Gamma(n+1)},\ \frac{\left(-\frac{1}{2}-\frac{\mathrm{I}\sqrt{3}}{2}\right)^n}{\Gamma(n+1)}\right] \tag{51}$$

```
> CPUTime(FPS[rectohyperterm](RE[26]=0,v(n),C))
```

$$0.219,\ \left\{\frac{1}{n!},\ \frac{n}{n!},\ \frac{(-1)^n}{n!},\ \frac{RootOf\left(\_Z^2+1\right)^n}{n!},\ \frac{RootOf\left(\_Z^2+\_Z+1\right)^n}{n!}\right\} \tag{52}$$

```
> CPUTime(LREtools[hypergeomsols](RE[27]=0,v(n),{},output=basis))
```

$$0.093,\ \left[\left(-\frac{1}{a-1}\right)^n,\ \left(-\frac{1}{a+1}\right)^n\right] \tag{53}$$

```
> CPUTime(FPS[rectohyperterm](RE[27]=0,v(n),C))
```

$$0.141,\ \left\{\left(-\frac{1}{a-1}\right)^n,\ \left(-\frac{1}{a+1}\right)^n\right\} \tag{54}$$

```
> CPUTime(LREtools[hypergeomsols](RE[28]=0,v(n),{},output=basis))
```

$$0.281,\ \left[\frac{(-\mathrm{I})^n}{\Gamma(n+1)},\ \frac{\mathrm{I}^n}{\Gamma(n+1)}\right] \tag{55}$$

```
> CPUTime(FPS[rectohyperterm](RE[28]=0,v(n),C))
```

$$0.594,\ \left\{\frac{RootOf\left(\_Z^2+1\right)^n}{n!}\right\} \tag{56}$$

```
> CPUTime(LREtools[hypergeomsols](RE[29]=0,v(n),{},output=basis))
```

$$0.422,\ \left[\left(-\frac{1}{a-1}\right)^n,\ \left(-\frac{1}{a+1}\right)^n\right] \tag{57}$$

```
> CPUTime(FPS[rectohyperterm](RE[29]=0,v(n),C))
```

$$0.531,\ \left\{\left(-\frac{1}{a-1}\right)^n,\ \left(-\frac{1}{a+1}\right)^n\right\} \tag{58}$$

```
> CPUTime(LREtools[hypergeomsols](RE[30]=0,v(n),{},output=basis))
```

$$0.515, \left[\left(-\frac{1}{a-1} \right)^n, \left(-\frac{1}{a+1} \right)^n, \frac{(-\mathrm{I})^n}{\Gamma(n+1)}, \frac{\mathrm{I}^n}{\Gamma(n+1)} \right] \tag{59}$$

```
> CPUTime(FPS[rectohyperterm](RE[30]=0,v(n),C))
```

$$0.797, \left\{ \left(-\frac{1}{a-1} \right)^n, \left(-\frac{1}{a+1} \right)^n, \frac{RootOf\left(\_Z^2+1\right)^n}{n!} \right\} \tag{60}$$

```
> CPUTime(LREtools[hypergeomsols](RE[31]=0,v(n),{},output=basis))
```

$$0.047, \left[\frac{\mathrm{I}^n}{\Gamma(n+1)}, \frac{(-\mathrm{I})^n}{\Gamma(n+1)} \right] \tag{61}$$

```
> CPUTime(FPS[rectohyperterm](RE[31]=0,v(n),C))
```

$$0.031, \left\{ \frac{RootOf\left(\_Z^2+1\right)^n}{n!} \right\} \tag{62}$$

```
> CPUTime(LREtools[hypergeomsols](RE[32]=0,v(n),{},output=basis))
```

$$0.047, 0 \tag{63}$$

```
> CPUTime(FPS[rectohyperterm](RE[32]=0,v(n),C))
```

$$0.047, \varnothing \tag{64}$$

```
> CPUTime(LREtools[hypergeomsols](RE[33]=0,v(n),{},output=basis))
```

$$0.062, \left[\left(-\frac{1}{a} \right)^n, \left(-\frac{1}{a-1} \right)^n \right] \tag{65}$$

```
> CPUTime(FPS[rectohyperterm](RE[33]=0,v(n),C))
```

$$0.094, \left\{ \left(-\frac{1}{a} \right)^n, \left(-\frac{1}{a-1} \right)^n \right\} \tag{66}$$

```
> CPUTime(LREtools[hypergeomsols](RE[34]=0,v(n),{},output=basis))
```

$$0.031, \left[\left(-\frac{1}{a+2} \right)^n (n+1) \right] \tag{67}$$

```
> CPUTime(FPS[rectohyperterm](RE[34]=0,v(n),C))
```

$$0.047, \left\{ \left(-\frac{1}{a+2} \right)^n (n+1) \right\} \tag{68}$$

```
> CPUTime(LREtools[hypergeomsols](RE[35]=0,v(n),{},output=basis))
```

$$0., 0 \tag{69}$$

```
> CPUTime(FPS[rectohyperterm](RE[35]=0,v(n),C))
```

$$0.015, \varnothing \tag{70}$$

```
> CPUTime(LREtools[hypergeomsols](RE[36]=0,v(n),{},output=basis))
```

$$0.047, \left[\left(-\frac{1}{a-1} \right)^n \right] \tag{71}$$

```
> CPUTime(FPS[rectohyperterm](RE[36]=0,v(n),C))
```

$$0.047, \left\{ \left(-\frac{1}{a-1} \right)^n \right\} \tag{72}$$

Hypergeometric term solutions in Maxima

(% i1) batchload(vanHoeijsREs)$

(% i2) batchload(HyperTermHoloRE)$

Hypergeometric terms and holonomic recurrence equations
Version 1.0
Execute 'Infos()' for details

https://www.bertrandteguia.com
University of Kassel, Germany

(% i3) showtime:true$

Evaluation took 0.0000 seconds (0.0000 elapsed) using 0 bytes.

(% i4) HypervanHoeij(RE[1],v[n],C);

Evaluation took 0.0000 seconds (0.0060 elapsed) using 1.375 MB.

$$\left\{\left(-\frac{1}{a-1}\right)^{n},\left(-\frac{1}{a-1}\right)^{n} n\right\} \qquad (\%\ o4)$$

(% i5) HypervanHoeij(RE[2],v[n],C);

Evaluation took 0.0160 seconds (0.0170 elapsed) using 3.812 MB

$$\left\{\frac{\left(-\frac{1}{a}\right)^{n}\ (2n)!}{4^{n}\ n!^{2}}\right\} \qquad (\%\ o5)$$

(% i6) HypervanHoeij(RE[3],v[n],C);

Evaluation took 0.0150 seconds (0.0050 elapsed) using 832.000 KB

$$\left\{\frac{\left(-\frac{1}{a-3}\right)^{n}}{n}\right\} \qquad (\%\ o6)$$

(% i7) HypervanHoeij(RE[4],v[n],C);

Evaluation took 0.0310 seconds (0.0260 elapsed) using 8.685 MB

$$\left\{\frac{\left(-\frac{1}{a}\right)^{n}\ (2n)!}{4^{n}\ n!^{2}}\right\} \qquad (\%\ o7)$$

(% i8) HypervanHoeij(RE[5],v[n],C);

Evaluation took 0.0160 seconds (0.0220 elapsed) using 7.373 MB

$$\left\{\left(-\frac{1}{a}\right)^{n},\left(-\frac{3}{3a-1}\right)^{n},\left(-\frac{3}{3a-1}\right)^{n}n\right\} \qquad (\%\ o8)$$

(% i9) HypervanHoeij(RE[6],v[n],C);

Evaluation took 0.0160 seconds (0.0140 elapsed) using 3.561 MB

$$\left\{\frac{\left(-\frac{1}{a+1}\right)^{n}}{(n-2)\ (n-1)\,n},\frac{\left(-\frac{1}{a}\right)^{n}\ \left(n^{2}-2an-3n+2a^{2}+4a+2\right)}{(n-2)\ (n-1)\,n}\right\} \qquad (\%\ o9)$$

(% i10) HypervanHoeij(RE[7],v[n],C);

Evaluation took 0.0470 seconds (0.0520 elapsed) using 14.558 MB

$$\left\{\left(-\frac{1}{a}\right)^{n}\ (n+3a+1)\right\} \qquad (\%\ o10)$$

(% i11) HypervanHoeij(RE[8],v[n],C);

Evaluation took 0.0150 seconds (0.0110 elapsed) using 2.561 MB

$$\left\{\left(-\frac{1}{a+1}\right)^{n}\right\} \qquad (\%\ o11)$$

(% i12) HypervanHoeij(RE[9],v[n],C);

Evaluation took 0.0000 seconds (0.0120 elapsed) using 2.810 MB

$$\{\} \qquad (\%\ o12)$$

(% i13) HypervanHoeij(RE[10],v[n],C);

Evaluation took 0.0160 seconds (0.0180 elapsed) using 6.373 MB

$$\left\{\left(-\frac{1}{a}\right)^{n}\ (n+1)\ (n+2)\ (n+3)\ (n+4),\left(-\frac{1}{a-1}\right)^{n}\ (n+1)\ (n+2)\ (n+3)\ (n+4)\ (n-a+6)\right\} \qquad (\%\ o13)$$

(% i14) HypervanHoeij(RE[11],v[n],C);

Evaluation took 0.0000 seconds (0.0000 elapsed) using 0 bytes.

$$\{\}$$ (% o14)

(% i15) HypervanHoeij(RE[12],v[n],C);

Evaluation took 0.0310 seconds (0.0360 elapsed) using 12.809 MB

$$\left\{\frac{(-\%i)^n}{n!},\frac{(-1)^{\frac{n}{2}}}{n!}\right\}$$ (% o15)

(% i16) HypervanHoeij(RE[13],v[n],C);

Evaluation took 0.0160 seconds (0.0130 elapsed) using 3.623 MB

$$\left\{\frac{\left(-\frac{1}{a}\right)^n\,(n-3a-3)}{(n-3)\,(n-2)\,(n-1)\,n},\frac{\left(-\frac{3}{3a+2}\right)^n\,(n+3a-1)}{(n-3)\,(n-2)\,(n-1)\,n}\right\}$$ (% o16)

(% i17) HypervanHoeij(RE[14],v[n],C);

Evaluation took 0.0150 seconds (0.0050 elapsed) using 1023.766 KB

$$\left\{\left(-\frac{1}{a-1}\right)^n\right\}$$ (% o17)

(% i18) HypervanHoeij(RE[15],v[n],C);

Evaluation took 0.9850 seconds (0.9840 elapsed) using 512.098 MB

$$\left\{\left(-\frac{1}{a-1}\right)^n,\left(-\frac{1}{a+1}\right)^n,\left(-\frac{a-\%i}{a^2+1}\right)^n,\left(-\frac{a+\%i}{a^2+1}\right)^n\right\}$$ (% o18)

(% i19) HypervanHoeij(RE[16],v[n],C);

Evaluation took 0.0310 seconds (0.0370 elapsed) using 13.496 MB

$$\{\}$$ (% o19)

(% i20) HypervanHoeij(RE[17],v[n],C);

Evaluation took 0.0160 seconds (0.0130 elapsed) using 3.749 MB

$$\{\}$$ (% o20)

(% i21) HypervanHoeij(RE[18],v[n],C);

Evaluation took 0.0150 seconds (0.0200 elapsed) using 6.685 MB

$$\{\}$$ (% o21)

(% i22) HypervanHoeij(RE[19],v[n],C);

Evaluation took 0.0470 seconds (0.0470 elapsed) using 17.994 MB

$$\left\{\left(-\frac{1}{a}\right)^{n}, \frac{\left(-\frac{1}{a}\right)^{n}}{(n-1)\,n}\right\}$$ (% o22)

(% i23) HypervanHoeij(RE[20],v[n],C);

Evaluation took 0.0470 seconds (0.0470 elapsed) using 12.433 MB

$$\left\{\frac{\left(-\frac{1}{a}\right)^{n}}{(n-4)\;(n-3)\;(n-2)\;(n-1)\,n}\right\}$$ (% o23)

(% i24) HypervanHoeij(RE[21],v[n],C);

Evaluation took 0.0470 seconds (0.0540 elapsed) using 21.120 MB

$$\left\{\left(-\frac{1}{a-1}\right)^{n}, \left(-\frac{1}{a}\right)^{n}, \left(-\frac{2}{2a+1}\right)^{n}, \left(-\frac{1}{a}\right)^{n} n\right\}$$ (% o24)

(% i25) HypervanHoeij(RE[22],v[n],C);

Evaluation took 0.0150 seconds (0.0030 elapsed) using 831.703 KB

$$\{\}$$ (% o25)

(% i26) HypervanHoeij(RE[23],v[n],C);

Evaluation took 0.0320 seconds (0.0360 elapsed) using 12.809 MB

$$\left\{\frac{(-\%i)^{n}}{n\,!}, \frac{(-1)^{\frac{n}{2}}}{n\,!}\right\}$$ (% o26)

(% i27) HypervanHoeij(RE[24],v[n],C);

Evaluation took 0.0470 seconds (0.0460 elapsed) using 16.119 MB

$$\left\{\frac{1}{n\,!}, \frac{(-1)^{n}}{n\,!}\right\}$$ (% o27)

(% i28) HypervanHoeij(RE[25],v[n],C);

Evaluation took 0.0000 seconds (0.0050 elapsed) using 1.249 MB

$\{\}$ (% o28)

(% i29) HypervanHoeij(RE[26],v[n],C);

Evaluation took 0.1400 seconds (0.1440 elapsed) using 62.676 MB

$$\left\{\frac{1}{n!},\frac{(-\%i)^n}{n!},\frac{\left(\frac{\sqrt{3}\%i-1}{2}\right)^n}{n!},\frac{\left(-\frac{\sqrt{3}\%i+1}{2}\right)^n}{n!},\frac{n}{n!},\frac{(-1)^{\frac{n}{2}}}{n!},\frac{(-1)^n}{n!}\right\} \quad (\%\ o29)$$

(% i30) HypervanHoeij(RE[27],v[n],C);

Evaluation took 2.7810 seconds (2.7870 elapsed) using 971.618 MB

$$\left\{\left(-\frac{1}{a-1}\right)^n,\left(-\frac{1}{a+1}\right)^n\right\} \quad (\%\ o30)$$

(% i31) HypervanHoeij(RE[28],v[n],C);

Evaluation took 0.2500 seconds (0.2420 elapsed) using 108.566 MB

$$\left\{\frac{(-\%i)^n}{n!},\frac{(-1)^{\frac{n}{2}}}{n!}\right\} \quad (\%\ o31)$$

(% i32) HypervanHoeij(RE[29],v[n],C);

Evaluation took 5.2810 seconds (5.3110 elapsed) using 3643.480 MB

$$\left\{\left(-\frac{1}{a-1}\right)^n,\left(-\frac{1}{a+1}\right)^n\right\} \quad (\%\ o32)$$

(% i33) HypervanHoeij(RE[30],v[n],C);

Evaluation took 0.4220 seconds (0.4240 elapsed) using 250.607 MB

$$\left\{\left(-\frac{1}{a-1}\right)^n,\left(-\frac{1}{a+1}\right)^n,\frac{(-\%i)^n}{n!},\frac{(-1)^{\frac{n}{2}}}{n!}\right\} \quad (\%\ o33)$$

(% i34) HypervanHoeij(RE[31],v[n],C);

Evaluation took 0.0000 seconds (0.0050 elapsed) using 703.859 KB

$$\left\{\frac{(-\%i)^n}{n!},\frac{(-1)^{\frac{n}{2}}}{n!}\right\} \quad (\%\ o34)$$

(% i35) HypervanHoeij(RE[32],v[n],C);

Evaluation took 0.0000 seconds (0.0080 elapsed) using 2.062 MB

$$\{\} \qquad (\%\ o35)$$

(% i36) HypervanHoeij(RE[33],v[n],C);

Evaluation took 0.0780 seconds (0.0850 elapsed) using 34.504 MB

$$\left\{\left(-\frac{1}{a-1}\right)^n, \left(-\frac{1}{a}\right)^n\right\} \qquad (\%\ o36)$$

(% i37) HypervanHoeij(RE[34],v[n],C);

Evaluation took 0.0160 seconds (0.0110 elapsed) using 2.749 MB

$$\left\{\left(-\frac{1}{a+2}\right)^n (n+1)\right\} \qquad (\%\ o37)$$

(% i38) HypervanHoeij(RE[35],v[n],C);

Evaluation took 0.0000 seconds (0.0040 elapsed) using 1.062 MB

$$\{\} \qquad (\%\ o38)$$

(% i39) HypervanHoeij(RE[36],v[n],C);

Evaluation took 0.0310 seconds (0.0260 elapsed) using 8.684 MB

$$\left\{\left(-\frac{1}{a-1}\right)^n\right\} \qquad (\%\ o39)$$