

## RCGAMMA1.mw

```
> R:=transmat([3,3,1,1]):B:=transmat([2,4,4,2]):#rank 3 / CC 32-34-14-12 --- checked for Delta *****
3311-2442 *****
```

```
> ##### START HERE #####
```

```
> Delta:=evalm((R-B)/2):A:=evalm((R+B)/2): `R`=matrans(R); `B`=matrans(B);
```

$$R = [3, 3, 1, 1]$$

$$B = [2, 4, 4, 2]$$

```
> A2:=evalm((1/2)*(R2+B2)):"det",det(evalm(J2-AA)), "synced?",det(J2-A2);
```

$$\text{"det", } \frac{117}{512}, \text{ "synced?", } 0$$

```
> ea2:=evalm((A2)^(1)&*uu);idx:={}:for i to NN do if (ea2[i]<1) then idx:=idx union {i} fi od:print("not crossed",idx);
```

$$ea2 := \left[ \frac{1}{2}, 1, \frac{1}{2}, \frac{1}{2}, 1, \frac{1}{2} \right]$$

$$\text{"not crossed", } \{1, 3, 4, 6\}$$

```
> unassign('x'):pi2:=evalm(1/x[1]*(linsolve(transpose(J2-A2),vector(NN,0),'r',x)));u2:=evalm((1/x[1]*linsolve(J2-A2,vector(N
```

$$\pi2 := [0, 1, 0, 0, 1, 0]$$

$$u2 := [1, 2, 1, 1, 2, 1]$$

```
> readVec(pi2);readVec(u2);
```

$$\{(2, 5)\}$$

$$\{(1, 2, 3, 4, 5, 6)\}$$

```
> evalm(2*Delta);#j2a:=evalm(J2-AA):evalm(j2a),det(j2a),evalf(det(j2a));
```

$$\begin{bmatrix} 0 & -1 & 1 & 0 \\ 0 & 0 & 1 & -1 \\ 1 & 0 & 0 & -1 \\ 1 & -1 & 0 & 0 \end{bmatrix}$$

```
> "DET",det(Del2),"Global Structure",evalm(AA&*uu);"Structure",evalm(Del2&*uu);#print("LEFT
NULL",Q2,"DELTA2",Del2,"RIGHT NULL",P2);
```

$$\text{"DET", } \frac{1}{512}$$

$$\text{"Global Structure", } \left[ \frac{3}{4}, 1, \frac{3}{4}, \frac{3}{4}, 1, \frac{3}{4} \right]$$

$$\text{"Structure", } \left[ \frac{-1}{4}, 0, \frac{-1}{4}, \frac{-1}{4}, 0, \frac{-1}{4} \right]$$

```
> print(P,Q);
```

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}, [-1 \quad 1 \quad -1 \quad 1]$$

```
> rdd:=read2(Del2):for i to nops(rdd[1]) do print(convert(choose(n,2)[i],set),i,rdd[1][i],"",rdd[2][i]) od;
```

```
{1, 2}, 1, [[5, "x"], [4, 6]], " ", [[{2, 4}, "x"], [{2, 3}, {3, 4}]]
{1, 3}, 2, [[2, 5], [1, 6]], " ", [[{1, 3}, {2, 4}], [{1, 2}, {3, 4}]]
{1, 4}, 3, [[2, "x"], [1, 4]], " ", [[{1, 3}, "x"], [{1, 2}, {2, 3}]]
{2, 3}, 4, [[2, "x"], [3, 6]], " ", [[{1, 3}, "x"], [{1, 4}, {3, 4}]]
{2, 4}, 5, [[2, 5], [3, 4]], " ", [[{1, 3}, {2, 4}], [{1, 4}, {2, 3}]]
{3, 4}, 6, [[5, "x"], [1, 3]], " ", [[{2, 4}, "x"], [{1, 2}, {1, 4}]]
```

```
> unassign('a'):V2:=transpose(linsolve(transpose(J2-AA),transpose(Del2),'r',a));
```

$$V2 := \begin{bmatrix} -\frac{19}{117} & -\frac{1}{9} & -\frac{17}{117} & -\frac{35}{117} & \frac{1}{9} & -\frac{46}{117} \\ -\frac{1}{9} & \frac{5}{9} & \frac{1}{9} & \frac{1}{9} & \frac{4}{9} & -\frac{1}{9} \\ -\frac{35}{117} & \frac{1}{9} & -\frac{19}{117} & -\frac{46}{117} & -\frac{1}{9} & -\frac{17}{117} \\ -\frac{17}{117} & \frac{1}{9} & -\frac{46}{117} & -\frac{19}{117} & -\frac{1}{9} & -\frac{35}{117} \\ \frac{1}{9} & \frac{4}{9} & -\frac{1}{9} & -\frac{1}{9} & \frac{5}{9} & \frac{1}{9} \\ -\frac{46}{117} & -\frac{1}{9} & -\frac{35}{117} & -\frac{17}{117} & \frac{1}{9} & -\frac{19}{117} \end{bmatrix}$$

"GAMMA" STARTS HERE

```
> NN:=binomial(n,2):J2:=IdentityMatrix(binomial(n,2)):unassign('e','x'):deta:=multiply(phi,Delta):
```

```
> APART:=evalm(symmult(A,J)+symmult(deta,J));#Y:=matvec(vv):ydt:=collect(trace(multiply(Y/2,APART)),[seq(x[k],k=1..n)])
```

$$APART := \begin{bmatrix} \frac{1}{2} + \frac{1}{2} t_1^2 & \frac{1}{4} + \frac{1}{4} t_1 t_2 & 0 & \frac{1}{4} + \frac{1}{4} t_1 t_4 \\ \frac{1}{4} + \frac{1}{4} t_1 t_2 & \frac{1}{2} + \frac{1}{2} t_2^2 & \frac{1}{4} + \frac{1}{4} t_2 t_3 & 0 \\ 0 & \frac{1}{4} + \frac{1}{4} t_2 t_3 & \frac{1}{2} + \frac{1}{2} t_3^2 & \frac{1}{4} + \frac{1}{4} t_3 t_4 \\ \frac{1}{4} + \frac{1}{4} t_1 t_4 & 0 & \frac{1}{4} + \frac{1}{4} t_3 t_4 & \frac{1}{2} + \frac{1}{2} t_4^2 \end{bmatrix}$$

```
> D2:=multiply(psi,Del2):A2:=evalm(AA+D2):#"x A2",ecliffe(xtend(A2));
```

```
> evalm(AA&*uu);evalm(A2&*uu);
```

$$\left[ \frac{3}{4}, 1, \frac{3}{4}, \frac{3}{4}, 1, \frac{3}{4} \right]$$

$$\left[ \frac{3}{4} - \frac{1}{4} t_1 t_2, 1, \frac{3}{4} - \frac{1}{4} t_1 t_4, \frac{3}{4} - \frac{1}{4} t_2 t_3, 1, \frac{3}{4} - \frac{1}{4} t_3 t_4 \right]$$

```
> unassign('t'):J2A2:=evalm(J2-A2):
```

DJ2 is the determinant with e's

```
> dt2:=det(J2-AA):"FROM det
Asup2",dt2;DJ2:=det(J2A2);ggamma:=subs({seq(t[k]=0,k=1..n)},DJ2);#gamma:=zcliffsubsmat(DJ2,vector(n,0)):"LOOKING
FOR",ggamma;
```

"FROM det Asup2",  $\frac{117}{512}$

$$DJ2 := \frac{19}{512} t_3 t_4 + \frac{117}{512} + \frac{9}{256} t_2^2 t_4^2 t_1 t_3 - \frac{17}{512} t_1 t_2 t_3 t_4 + \frac{3}{256} t_2^2 t_3^2 t_1 t_4 + \frac{3}{256} t_1 t_2 t_3^2 t_4^2 - \frac{1}{256} t_1^2 t_2 t_4 - \frac{3}{128} t_2^2 t_4 t_1$$

$$- \frac{3}{128} t_2 t_4^2 t_3 - \frac{3}{128} t_2^2 t_4 t_3 - \frac{1}{256} t_1 t_4^2 t_3 + \frac{3}{256} t_1^2 t_2^2 t_3 t_4 - \frac{5}{512} t_1^2 t_2^2 t_3^2 t_4^2 + \frac{1}{256} t_2^3 t_3^2 t_1^2 t_4 - \frac{1}{512} t_1^3 t_2^3 t_3^2 t_4^2$$

$$- \frac{1}{512} t_2^3 t_3^2 t_1^2 t_4^3 + \frac{9}{256} t_1^2 t_2^2 t_3 t_4 + \frac{1}{256} t_1^3 t_2^2 t_4^2 t_3 - \frac{3}{128} t_1^2 t_3 t_4 + \frac{3}{256} t_1^2 t_2 t_4^2 t_3 - \frac{1}{256} t_2 t_3^2 t_4 + \frac{19}{512} t_1 t_2 - \frac{65}{512} t_1$$

$$+ \frac{19}{512} t_1 t_4 + \frac{19}{512} t_2 t_3 - \frac{65}{512} t_2 t_4 - \frac{1}{512} t_1^2 t_4^3 t_2^2 t_3^3 - \frac{3}{128} t_1^2 t_2 t_3 - \frac{1}{512} t_2^2 t_4^3 t_1^3 t_3^2 - \frac{1}{512} t_2^2 t_3^3 t_1^3 t_4^2 - \frac{1}{512} t_1^2 t_3^3 t_2^3$$

$$+ \frac{1}{512} t_1^3 t_3^3 t_2^3 t_4^3 + \frac{1}{256} t_2 t_4^3 t_1^2 t_3^2 - \frac{1}{256} t_2^2 t_3 t_1 - \frac{3}{128} t_1 t_3^2 t_4 - \frac{3}{128} t_1 t_4^2 t_2 - \frac{3}{128} t_1 t_3^2 t_2 + \frac{1}{256} t_2^2 t_3^3 t_1 t_4^2$$

ggamma :=  $\frac{117}{512}$

```
> unassign('e');dj2:=subs([seq(t[k]=e[k],k=1..n)],DJ2):det2:=ecliffit(dj2);gamma:=ecliffsubs(det2,zeta):"gamma",gamma,eval
```

$$det2 := -\frac{1}{32} e_1 e_2 e_3 e_4 - \frac{3}{32} e_1 e_3 + \frac{7}{32} - \frac{3}{32} e_2 e_4$$

"gamma",  $\frac{7}{32}$ , 0.2187500000

"difference", 0.009765625000

```
> for i to n do seq(extpow(psi,i)[k,k],k=1..binomial(NN,i)) od;
```

$$t_1 t_2, t_1 t_3, t_1 t_4, t_2 t_3, t_2 t_4, t_3 t_4$$

$$t_1^2 t_2 t_3, t_1^2 t_2 t_4, t_2^2 t_3 t_1, t_2^2 t_4 t_1, t_1 t_2 t_3 t_4, t_1^2 t_3 t_4, t_1 t_3^2 t_2, t_1 t_2 t_3 t_4, t_1 t_3^2 t_4, t_1 t_2 t_3 t_4, t_1 t_4^2 t_2, t_1 t_4^2 t_3,$$

$$t_2^2 t_4 t_3, t_2 t_3^2 t_4, t_2 t_4^2 t_3$$

$$t_1^3 t_3 t_2 t_4, t_1^2 t_2^2 t_3^2, t_1^2 t_2^2 t_3 t_4, t_1^2 t_3^2 t_2 t_4, t_1^2 t_2^2 t_3 t_4, t_1^2 t_2^2 t_4^2, t_1^2 t_2 t_4^2 t_3, t_2^3 t_4 t_3 t_1, t_2^2 t_3^2 t_1 t_4, t_2^2 t_4^2 t_1 t_3,$$

$$t_1^2 t_3^2 t_2 t_4, t_1^2 t_2 t_4^2 t_3, t_1^2 t_3^2 t_4^2, t_2^2 t_3^2 t_1 t_4, t_1 t_3^3 t_2 t_4, t_1 t_2 t_3^2 t_4^2, t_2^2 t_4^2 t_1 t_3, t_1 t_2 t_3^2 t_4^2, t_1 t_4^3 t_2 t_3, t_2^2 t_3^2 t_4^2$$

$$t_1^3 t_2^2 t_3^2 t_4, t_1^3 t_2^2 t_4^2 t_3, t_1^3 t_2 t_3^2 t_4^2, t_2^3 t_3^2 t_1^2 t_4, t_1^2 t_2^2 t_3^3 t_4, t_1^2 t_2^2 t_3^2 t_4^2, t_1^2 t_3^3 t_4^2 t_3, t_1^2 t_2^2 t_3^2 t_4^2, t_1^2 t_2^2 t_4^3 t_3,$$

$$t_1 t_2^3 t_3^2 t_4^2, t_1^2 t_2^2 t_3^2 t_4^2, t_1^2 t_3^3 t_2 t_4^2, t_2 t_4^3 t_1^2 t_3^2, t_2^2 t_3^3 t_1 t_4^2, t_1 t_4^3 t_2^2 t_3^2$$

```
> nu:=binomial(n,2):unassign('e','t','x','FX'):e:=vector(n):FX:=1:for i to nu do
val:=choose(n,2)[i]:FX:=ecliffit(FX+FX*x[i]*e[val[1]]*e[val[2]])
```

```
> od:G:=ecliffsubs(FX,vector(n,0));nops(G);
```

$$G := 1 + x_5 x_4 x_3 x_2 + x_6 x_3 x_2 + x_6 x_5 x_4 + x_4 x_2 x_1 + x_5 x_3 x_1 + x_6 x_5 x_2 x_1 + x_6 x_4 x_3 x_1$$

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```
> gxc:=CORE(G,J2-AA,-evalm(psi&*Del2),true):print(gxc),"gamma",gamma;
```

{},  $\frac{117}{512}$

$$\{2, 3, 4, 5\}, -\frac{3}{512} t_1^2 t_2^2 t_3^2 t_4^2$$

{2, 3, 6}, 0

{4, 5, 6}, 0

{1, 2, 4}, 0

$$\{1, 3, 5\}, 0$$

$$\{1, 2, 5, 6\}, -\frac{3}{512} t_1^2 t_2^2 t_3^2 t_4^2$$

$$\{1, 3, 4, 6\}, \frac{1}{512} t_1^2 t_2^2 t_3^2 t_4^2$$

$$\frac{117}{512} - \frac{5}{512} t_1^2 t_2^2 t_3^2 t_4^2, \left[ \frac{117}{512}, -\frac{3}{512} t_1^2 t_2^2 t_3^2 t_4^2, 0, 0, 0, 0, -\frac{3}{512} t_1^2 t_2^2 t_3^2 t_4^2, \frac{1}{512} t_1^2 t_2^2 t_3^2 t_4^2 \right]$$

$$\text{"gamma"}, \frac{7}{32}$$

>

## RCGAMMA2.mw

```
> R:=transmat([4,3,1,2]):B:=transmat([3,4,4,3]):#rank 3 / CC 43-34-14-23 --- checked for Delta
*****4*****
```

```
> ##### START HERE #####
```

```
> Delta:=evalm((R-B)/2):A:=evalm((R+B)/2): `R`=matrans(R); `B`=matrans(B);
```

$$R = [4, 3, 1, 2]$$

$$B = [3, 4, 4, 3]$$

```
> A2:=evalm((1/2)*(R2+B2)): "det", det(evalm(J2-AA)), "synced?", det(J2-A2);
```

$$\text{"det", } \frac{3}{16}, \text{ "synced?", } 0$$

```
> ea2:=evalm((A2)^(1)&*uu);idx:={}:for i to NN do if (ea2[i]<1) then idx:=idx union {i} fi od:print("not crossed",idx);
```

$$ea2 := \left[ 1, 1, \frac{1}{2}, \frac{1}{2}, 1, 1 \right]$$

$$\text{"not crossed", } \{3, 4\}$$

```
> unassign('x'):pi2:=evalm(1/x[1]*(linsolve(transpose(J2-A2),vector(NN,0),'r',x)));u2:=evalm((1/x[1]*linsolve(J2-A2,vector(N
```

$$\pi2 := [1, 0, 0, 0, 0, 2]$$

$$u2 := [3, 2, 1, 1, 2, 3]$$

```
> readVec(pi2);readVec(u2);
```

$$\{(1, 6)\}$$

$$\{(1, 2, 3, 4, 5, 6)\}$$

```
> evalm(2*Delta);#j2a:=evalm(J2-AA):evalm(j2a),det(j2a),evalf(det(j2a));
```

$$\begin{bmatrix} 0 & 0 & -1 & 1 \\ 0 & 0 & 1 & -1 \\ 1 & 0 & 0 & -1 \\ 0 & 1 & -1 & 0 \end{bmatrix}$$

```
> "DET",det(Del2),"Global Structure",evalm(AA&*uu);"Structure",evalm(Del2&*uu);#print("LEFT
NULL",Q2,"DELTA2",Del2,"RIGHT NULL",P2);
```

$$\text{"DET", } 0$$

$$\text{"Global Structure", } \left[ \frac{1}{2}, \frac{3}{4}, \frac{3}{4}, \frac{3}{4}, \frac{3}{4}, 1 \right]$$

$$\text{"Structure", } \left[ \frac{1}{2}, \frac{1}{4}, \frac{-1}{4}, \frac{-1}{4}, \frac{1}{4}, 0 \right]$$

```
> print(P,Q);
```

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}, [1 \ 1 \ 0 \ 0]$$

```
> rdd:=read2(Del2):for i to nops(rdd[1]) do print(convert(choose(n,2)[i],set),i,rdd[1][i],"",rdd[2][i]) od;
```

```
{1, 2}, 1, [[6, 6], [{"x", "x"}], " ", [{"{3, 4}, {3, 4}], [{"x", "x"}]
{1, 3}, 2, [[3, 6], [2, "x"]], " ", [{"{1, 4}, {3, 4}], [{1, 3}, "x"]}
{1, 4}, 3, [[5, "x"], [4, 6]], " ", [{"{2, 4}, "x"}, [{2, 3}, {3, 4}]]
{2, 3}, 4, [[2, "x"], [3, 6]], " ", [{"{1, 3}, "x"}, [{1, 4}, {3, 4}]]
{2, 4}, 5, [[4, 6], [5, "x"]], " ", [{"{2, 3}, {3, 4}], [{2, 4}, "x"]}
{3, 4}, 6, [[1, 6], [2, 5]], " ", [{"{1, 2}, {3, 4}], [{1, 3}, {2, 4}]]
```

j2a2 is the numerical I-A\_2

```
> unassign('a'):V2:=transpose(linsolve(transpose(J2-AA),transpose(Del2),'r',a));
```

$$V2 := \begin{bmatrix} \frac{1}{3} & \frac{1}{2} & \frac{1}{6} & \frac{1}{6} & \frac{1}{2} & \frac{4}{3} \\ \frac{1}{6} & -\frac{1}{16} & \frac{13}{48} & \frac{7}{48} & \frac{5}{16} & \frac{2}{3} \\ -\frac{1}{6} & -\frac{5}{16} & -\frac{7}{48} & -\frac{13}{48} & \frac{1}{16} & -\frac{2}{3} \\ -\frac{1}{6} & \frac{1}{16} & -\frac{13}{48} & -\frac{7}{48} & -\frac{5}{16} & -\frac{2}{3} \\ \frac{1}{6} & \frac{5}{16} & \frac{7}{48} & \frac{13}{48} & -\frac{1}{16} & \frac{2}{3} \\ \frac{1}{3} & -\frac{1}{4} & -\frac{1}{12} & -\frac{1}{12} & -\frac{1}{4} & \frac{1}{3} \end{bmatrix}$$

"GAMMA" STARTS HERE

```
> NN:=binomial(n,2):J2:=IdentityMatrix(binomial(n,2)):unassign('e','x'):deta:=multiply(phi,Delta):
```

```
> APART:=evalm(symmult(A,J)+symmult(deta,J));#Y:=matvec(vv):ydt:=collect(trace(multiply(Y/2,APART)),[seq(x[k],k=1..n)])
```

$$APART := \begin{bmatrix} \frac{1}{2} + \frac{1}{2} t_1^2 & \frac{1}{2} - \frac{1}{2} t_1 t_2 & \frac{1}{4} - \frac{1}{4} t_1 t_3 & \frac{1}{4} + \frac{1}{4} t_1 t_4 \\ \frac{1}{2} - \frac{1}{2} t_1 t_2 & \frac{1}{2} + \frac{1}{2} t_2^2 & \frac{1}{4} + \frac{1}{4} t_2 t_3 & \frac{1}{4} - \frac{1}{4} t_2 t_4 \\ \frac{1}{4} - \frac{1}{4} t_1 t_3 & \frac{1}{4} + \frac{1}{4} t_2 t_3 & \frac{1}{2} + \frac{1}{2} t_3^2 & 0 \\ \frac{1}{4} + \frac{1}{4} t_1 t_4 & \frac{1}{4} - \frac{1}{4} t_2 t_4 & 0 & \frac{1}{2} + \frac{1}{2} t_4^2 \end{bmatrix}$$

```
> D2:=multiply(psi,Del2):A2:=evalm(AA+D2):#"x A2",ecliffe(xtend(A2));
```

```
> evalm(AA&*uu);evalm(A2&*uu);
```

$$\left[ \frac{1}{2}, \frac{3}{4}, \frac{3}{4}, \frac{3}{4}, \frac{3}{4}, 1 \right]$$

$$\left[ \frac{1}{2} + \frac{1}{2} t_1 t_2, \frac{3}{4} + \frac{1}{4} t_1 t_3, \frac{3}{4} - \frac{1}{4} t_1 t_4, \frac{3}{4} - \frac{1}{4} t_2 t_3, \frac{3}{4} + \frac{1}{4} t_2 t_4, 1 \right]$$

```
> unassign('t'):J2A2:=evalm(J2-A2):
```

DJ2 is the determinant with e's

```
> dt2:=det(J2-AA):"FROM det
Asup2",dt2;DJ2:=det(J2A2);ggamma:=subs({seq(t[k]=0,k=1..n)},DJ2);#gamma:=zcliffsubsmat(DJ2,vector(n,0)):"LOOKINC
```

FOR",ggamma;

"FROM det Asup2",  $\frac{3}{16}$

$$\begin{aligned}
 DJ2 := & -\frac{7}{512} t_2^2 t_4^2 t_3^2 - \frac{7}{512} t_1^2 t_3^2 t_4^2 - \frac{1}{16} t_3 t_4 - \frac{1}{512} t_2^3 t_3^2 t_4^2 t_1 - \frac{1}{512} t_2^3 t_3 t_4 t_1 - \frac{1}{512} t_1^3 t_3 t_2 t_4 - \frac{1}{512} t_1^3 t_3^2 t_2 t_4^2 \\
 & - \frac{5}{256} t_2^2 t_4^2 t_1 t_3 - \frac{23}{256} t_1 t_2 t_3 t_4 - \frac{1}{256} t_2^2 t_3^2 t_1 t_4 + \frac{9}{256} t_1 t_2 t_3^2 t_4^2 - \frac{1}{256} t_1^2 t_2 t_4 - \frac{5}{256} t_2^2 t_4 t_1 + \frac{7}{256} t_2 t_4^2 t_3 \\
 & + \frac{9}{512} t_2^2 t_4 t_3 - \frac{5}{256} t_1 t_4^2 t_3 - \frac{1}{256} t_1^2 t_2^2 t_3 t_4 - \frac{1}{256} t_1^2 t_2^2 t_3^2 t_4^2 - \frac{5}{256} t_1^2 t_3^2 t_2 t_4 + \frac{9}{512} t_1^2 t_3 t_4 - \frac{1}{256} t_1^2 t_2 t_4^2 t_3 \\
 & - \frac{5}{256} t_2 t_3^2 t_4 - \frac{1}{16} t_1 t_2 + \frac{3}{256} t_1 t_3 + \frac{7}{256} t_1 t_4 + \frac{7}{256} t_2 t_3 + \frac{3}{256} t_2 t_4 - \frac{5}{256} t_1^2 t_2 t_3 - \frac{1}{256} t_2^2 t_3 t_1 + \frac{7}{256} t_1 t_3^2 t_4 + \frac{3}{16}
 \end{aligned}$$

$$ggamma := \frac{3}{16}$$

> unassign('e');dj2:=subs([seq(t[k]=e[k],k=1..n)],DJ2):det2:=ecliffit(dj2);gamma:=ecliffsubs(det2,zeta):"gamma",gamma,eval

$$det2 := -\frac{3}{32} e_1 e_2 e_3 e_4 - \frac{1}{32} e_1 e_2 - \frac{1}{32} e_1 e_3 + \frac{1}{32} e_1 e_4 + \frac{1}{32} e_2 e_3 - \frac{1}{32} e_2 e_4 - \frac{1}{32} e_3 e_4 + \frac{5}{32}$$

$$"gamma", \frac{5}{32}, 0.1562500000$$

$$"difference", 0.03125000000$$

> nu:=binomial(n,2):unassign('e','t','x','FX'):e:=vector(n):FX:=1:for i to nu do  
val:=choose(n,2)[i]:FX:=ecliffit(FX+FX\*x[i]\*e[val[1]]\*e[val[2]])

> od:G:=ecliffsubs(FX,vector(n,0));nops(G);

$$G := 1 + x_6 x_4 x_3 x_1 + x_6 x_5 x_4 + x_6 x_3 x_2 + x_5 x_4 x_3 x_2 + x_6 x_5 x_2 x_1 + x_4 x_2 x_1 + x_5 x_3 x_1$$

8

> gxc:=CORE(G,J2-AA,-evalm(psi&\*Del2),true):print(gxc),"gamma",gamma;

$$\{\}, \frac{3}{16}$$

$$\{1, 3, 4, 6\}, \frac{1}{512} t_1^2 t_2^2 t_3^2 t_4^2$$

$$\{4, 5, 6\}, -\frac{7}{512} t_2^2 t_4^2 t_3^2$$

$$\{2, 3, 6\}, -\frac{7}{512} t_1^2 t_3^2 t_4^2$$

$$\{2, 3, 4, 5\}, 0$$

$$\{1, 2, 5, 6\}, -\frac{3}{512} t_1^2 t_2^2 t_3^2 t_4^2$$

$$\{1, 2, 4\}, 0$$

$$\{1, 3, 5\}, 0$$

$$\begin{aligned}
 & \frac{3}{16} - \frac{1}{256} t_1^2 t_2^2 t_3^2 t_4^2 - \frac{7}{512} t_2^2 t_4^2 t_3^2 - \frac{7}{512} t_1^2 t_3^2 t_4^2, \\
 & \left[ \frac{3}{16}, \frac{1}{512} t_1^2 t_2^2 t_3^2 t_4^2, -\frac{7}{512} t_2^2 t_4^2 t_3^2, -\frac{7}{512} t_1^2 t_3^2 t_4^2, 0, -\frac{3}{512} t_1^2 t_2^2 t_3^2 t_4^2, 0, 0 \right]
 \end{aligned}$$

$$"gamma", \frac{5}{32}$$

>

## RCGAMMA3.mw

```
> R:=transmat([2,4,4,2,6,5]):B:=transmat([3,6,5,3,1,4]):#rank 4 / CC 23-46-45-23-61-54 ***** 6 244265-365314
*****
```

```
> ##### START HERE #####
```

```
> Delta:=evalm((R-B)/2):A:=evalm((R+B)/2): `R`=matrans(R); `B`=matrans(B);
```

$$R = [2, 4, 4, 2, 6, 5]$$

$$B = [3, 6, 5, 3, 1, 4]$$

```
> A2:=evalm((1/2)*(R2+B2)): "det", det(evalm(J2-AA)), "synced?", det(J2-A2);
```

$$\text{"det", } \frac{231}{2048}, \text{ "synced?", } 0$$

```
> ea2:=evalm((A2)^(1)&*uu);idx:={}:for i to NN do if (ea2[i]<1) then idx:=idx union {i} fi od:print("not crossed",idx);
```

$$ea2 := \left[ 1, 1, 0, 1, 1, \frac{1}{2}, 1, 1, 1, 1, 1, 1, 1, 1, 1 \right]$$

$$\text{"not crossed", } \{3, 6\}$$

```
> unassign('x'):pi2:=evalm(1/x[1]*(linsolve(transpose(J2-A2),vector(NN,0),'r',x)));u2:=evalm((1/x[1]*linsolve(J2-A2,vector(N
```

$$\pi2 := [0, 2, 0, 1, 1, 0, 4, 2, 2, 2, 2, 2, 3, 3, 0]$$

$$u2 := [1, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0]$$

```
> readVec(pi2);readVec(u2);
```

$$\{\{2, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14\}\}$$

$$\{\{1, 2, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14\}\}$$

```
> evalm(2*Delta);#j2a:=evalm(J2-AA):evalm(j2a),det(j2a),evalf(det(j2a));
```

$$\begin{bmatrix} 0 & 1 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & -1 \\ 0 & 0 & 0 & 1 & -1 & 0 \\ 0 & 1 & -1 & 0 & 0 & 0 \\ -1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & -1 & 1 & 0 \end{bmatrix}$$

```
> "DET",det(Del2);"Global Structure",evalm(AA&*uu);"Structure",evalm(Del2&*uu);#print("LEFT
NULL",Q2,"DELTA2",Del2,"RIGHT NULL",P2);
```

$$\text{"DET", } 0$$

$$\text{"Global Structure", } \left[ 1, 1, \frac{1}{2}, 1, 1, \frac{3}{4}, 1, \frac{3}{4}, \frac{3}{4}, 1, 1, \frac{1}{2}, 1, 1, 1 \right]$$

$$\text{"Structure", } \left[ 0, 0, \frac{-1}{2}, 0, 0, \frac{-1}{4}, 0, \frac{1}{4}, \frac{1}{4}, 0, 0, \frac{1}{2}, 0, 0, 0 \right]$$

```
> print(P,Q);
```



$$\begin{bmatrix} 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \end{bmatrix}, \begin{bmatrix} -1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

```
> rdd:=read2(Del2):for i to nops(rdd[1]) do print(convert(choose(n,2)[i],set),i,rdd[1][i],"",rdd[2][i]) od;
```

```
{1, 2}, 1, [[7, 12], [9, 10]], " ", [[{2, 4}, {3, 6}], [{2, 6}, {3, 4}]]
{1, 3}, 2, [[7, 11], [8, 10]], " ", [[{2, 4}, {3, 5}], [{2, 5}, {3, 4}]]
{1, 4}, 3, [{"x", "x"}, [6, 6]], " ", [{"x", "x"}, [{2, 3}, {2, 3}]]
{1, 5}, 4, [[2, 9], [1, 12]], " ", [[{1, 3}, {2, 6}], [{1, 2}, {3, 6}]]
{1, 6}, 5, [[8, 10], [7, 11]], " ", [[{2, 5}, {3, 4}], [{2, 4}, {3, 5}]]
{2, 3}, 6, [[15, "x"], [13, 14]], " ", [[{5, 6}, "x"], [{4, 5}, {4, 6}]]
{2, 4}, 7, [[7, 12], [9, 10]], " ", [[{2, 4}, {3, 6}], [{2, 6}, {3, 4}]]
{2, 5}, 8, [[5, 14], [3, "x"]], " ", [[{1, 6}, {4, 6}], [{1, 4}, "x"]]
{2, 6}, 9, [[13, 14], [15, "x"]], " ", [[{4, 5}, {4, 6}], [{5, 6}, "x"]]
{3, 4}, 10, [[7, 11], [8, 10]], " ", [[{2, 4}, {3, 5}], [{2, 5}, {3, 4}]]
{3, 5}, 11, [[4, 14], [3, 15]], " ", [[{1, 5}, {4, 6}], [{1, 4}, {5, 6}]]
{3, 6}, 12, [[13, 13], ["x", "x"]], " ", [[{4, 5}, {4, 5}], ["x", "x"]]
{4, 5}, 13, [[2, 9], [1, 12]], " ", [[{1, 3}, {2, 6}], [{1, 2}, {3, 6}]]
{4, 6}, 14, [[8, 10], [7, 11]], " ", [[{2, 5}, {3, 4}], [{2, 4}, {3, 5}]]
{5, 6}, 15, [[3, 15], [4, 14]], " ", [[{1, 4}, {5, 6}], [{1, 5}, {4, 6}]]
```

j2a2 is the numerical I-A\_2

```
> unassign('a'):V2:=transpose(linsolve(transpose(J2-AA),transpose(Del2),'r',a));
```

$$v2 := \begin{bmatrix} \frac{1}{231} & \frac{1}{231} & \frac{-23}{231} & \frac{-61}{924} & \frac{-31}{924} & \frac{-23}{462} & \frac{12}{77} & \frac{-31}{231} & \frac{-95}{462} & \frac{-53}{154} & \frac{-31}{231} & \frac{68}{231} & \frac{1}{12} & \frac{-151}{924} & \frac{-10}{77} \\ \frac{71}{1848} & \frac{71}{1848} & \frac{-2}{231} & \frac{65}{924} & \frac{-73}{924} & \frac{-1}{231} & \frac{159}{616} & \frac{-73}{231} & \frac{26}{231} & \frac{-149}{616} & \frac{85}{462} & \frac{26}{231} & \frac{1}{12} & \frac{17}{924} & \frac{15}{154} \\ \frac{-4}{33} & \frac{-4}{33} & \frac{-7}{33} & \frac{-5}{33} & \frac{-2}{33} & \frac{-20}{33} & \frac{-4}{11} & \frac{-8}{33} & \frac{-8}{33} & \frac{-4}{11} & \frac{-8}{33} & \frac{-8}{33} & \frac{-1}{3} & \frac{-14}{33} & \frac{-4}{11} \\ \frac{-235}{924} & \frac{227}{924} & \frac{23}{231} & \frac{61}{924} & \frac{31}{924} & \frac{23}{462} & \frac{29}{308} & \frac{31}{231} & \frac{95}{462} & \frac{29}{308} & \frac{31}{231} & \frac{-68}{231} & \frac{-1}{12} & \frac{151}{924} & \frac{10}{77} \\ \frac{-71}{1848} & \frac{-71}{1848} & \frac{2}{231} & \frac{-65}{924} & \frac{73}{924} & \frac{1}{231} & \frac{-159}{616} & \frac{73}{231} & \frac{-26}{231} & \frac{149}{616} & \frac{-85}{462} & \frac{-26}{231} & \frac{-1}{12} & \frac{-17}{924} & \frac{-15}{154} \\ \frac{-7}{66} & \frac{-7}{66} & \frac{-2}{33} & \frac{-1}{132} & \frac{-7}{132} & \frac{-1}{33} & \frac{-7}{22} & \frac{-7}{33} & \frac{-7}{33} & \frac{-7}{22} & \frac{-7}{33} & \frac{-7}{33} & \frac{-5}{12} & \frac{-49}{132} & \frac{2}{11} \\ \frac{1}{231} & \frac{1}{231} & \frac{-23}{231} & \frac{-61}{924} & \frac{-31}{924} & \frac{-23}{462} & \frac{12}{77} & \frac{-31}{231} & \frac{-95}{462} & \frac{-53}{154} & \frac{-31}{231} & \frac{68}{231} & \frac{1}{12} & \frac{-151}{924} & \frac{-10}{77} \\ \frac{71}{924} & \frac{71}{924} & \frac{-4}{231} & \frac{65}{462} & \frac{79}{231} & \frac{-2}{231} & \frac{159}{308} & \frac{85}{231} & \frac{52}{231} & \frac{159}{308} & \frac{85}{231} & \frac{52}{231} & \frac{1}{6} & \frac{124}{231} & \frac{15}{77} \\ \frac{7}{66} & \frac{7}{66} & \frac{2}{33} & \frac{1}{132} & \frac{7}{132} & \frac{1}{33} & \frac{7}{22} & \frac{7}{33} & \frac{7}{33} & \frac{7}{22} & \frac{7}{33} & \frac{7}{33} & \frac{5}{12} & \frac{49}{132} & \frac{-2}{11} \\ \frac{71}{1848} & \frac{71}{1848} & \frac{-2}{231} & \frac{65}{924} & \frac{-73}{924} & \frac{-1}{231} & \frac{159}{616} & \frac{-73}{231} & \frac{26}{231} & \frac{-149}{616} & \frac{85}{462} & \frac{26}{231} & \frac{1}{12} & \frac{17}{924} & \frac{15}{154} \\ \frac{5}{66} & \frac{5}{66} & \frac{-8}{33} & \frac{29}{132} & \frac{5}{132} & \frac{-4}{33} & \frac{5}{22} & \frac{5}{33} & \frac{5}{33} & \frac{5}{22} & \frac{5}{33} & \frac{5}{33} & \frac{1}{12} & \frac{35}{132} & \frac{-3}{11} \\ \frac{223}{924} & \frac{223}{924} & \frac{46}{231} & \frac{61}{462} & \frac{31}{462} & \frac{23}{231} & \frac{135}{308} & \frac{62}{231} & \frac{95}{231} & \frac{135}{308} & \frac{62}{231} & \frac{95}{231} & \frac{5}{6} & \frac{151}{462} & \frac{20}{77} \\ \frac{-235}{924} & \frac{227}{924} & \frac{23}{231} & \frac{61}{924} & \frac{31}{924} & \frac{23}{462} & \frac{29}{308} & \frac{31}{231} & \frac{95}{462} & \frac{29}{308} & \frac{31}{231} & \frac{-68}{231} & \frac{-1}{12} & \frac{151}{924} & \frac{10}{77} \\ \frac{-71}{1848} & \frac{-71}{1848} & \frac{2}{231} & \frac{-65}{924} & \frac{73}{924} & \frac{1}{231} & \frac{-159}{616} & \frac{73}{231} & \frac{-26}{231} & \frac{149}{616} & \frac{-85}{462} & \frac{-26}{231} & \frac{-1}{12} & \frac{-17}{924} & \frac{-15}{154} \\ \frac{-5}{66} & \frac{-5}{66} & \frac{8}{33} & \frac{-29}{132} & \frac{-5}{132} & \frac{4}{33} & \frac{-5}{22} & \frac{-5}{33} & \frac{-5}{33} & \frac{-5}{22} & \frac{-5}{33} & \frac{-5}{33} & \frac{-1}{12} & \frac{-35}{132} & \frac{3}{11} \end{bmatrix}$$

"GAMMA" STARTS HERE

> NN:=binomial(n,2);J2:=IdentityMatrix(binomial(n,2));unassign('e','x'):deta:=multiply(phi,Delta):

> APART:=evalm(symult(A,J)+symult(deta,J));#Y:=matvec(vv):ydt:=collect(trace(multiply(Y/2,APART)),[seq(x[k],k=1..n)])

$$APART := \begin{bmatrix} \frac{1}{2} + \frac{1}{2} t_1^2 & 0 & 0 & \frac{1}{2} + \frac{1}{2} t_1 t_4 & 0 & 0 \\ 0 & \frac{1}{2} + \frac{1}{2} t_2^2 & \frac{1}{4} + \frac{1}{4} t_2 t_3 & 0 & \frac{1}{4} - \frac{1}{4} t_2 t_5 & \frac{1}{4} - \frac{1}{4} t_2 t_6 \\ 0 & \frac{1}{4} + \frac{1}{4} t_2 t_3 & \frac{1}{2} + \frac{1}{2} t_3^2 & 0 & 0 & \frac{1}{2} - \frac{1}{2} t_3 t_6 \\ \frac{1}{2} + \frac{1}{2} t_1 t_4 & 0 & 0 & \frac{1}{2} + \frac{1}{2} t_4^2 & 0 & 0 \\ 0 & \frac{1}{4} - \frac{1}{4} t_2 t_5 & 0 & 0 & \frac{1}{2} + \frac{1}{2} t_5^2 & 0 \\ 0 & \frac{1}{4} - \frac{1}{4} t_2 t_6 & \frac{1}{2} - \frac{1}{2} t_3 t_6 & 0 & 0 & \frac{1}{2} + \frac{1}{2} t_6^2 \end{bmatrix}$$

> D2:=multiply(psi,Del2):A2:=evalm(AA+D2):#"x A2",ecliffe(xtend(A2));

> evalm(AA&\*uu);evalm(A2&\*uu);

$$\left[ 1, 1, \frac{1}{2}, 1, 1, \frac{3}{4}, 1, \frac{3}{4}, \frac{3}{4}, 1, 1, \frac{1}{2}, 1, 1, 1 \right]$$

$$\left[ 1, 1, \frac{1}{2} - \frac{1}{2} t_1 t_4, 1, 1, \frac{3}{4} - \frac{1}{4} t_2 t_3, 1, \frac{3}{4} + \frac{1}{4} t_2 t_5, \frac{3}{4} + \frac{1}{4} t_2 t_6, 1, 1, \frac{1}{2} + \frac{1}{2} t_3 t_6, 1, 1, 1 \right]$$

> unassign('t');J2A2:=evalm(J2-A2):

DJ2 is the determinant with e's

> dt2:=det(J2-AA):"FROM det Asup2",dt2;DJ2:=det(J2A2);ggamma:=subs((seq(t[k]=0,k=1..n)),DJ2);#gamma:=zcliffsubsmat(DJ2,vector(n,0)):"LOOKING FOR",ggamma;

"FROM det Asup2",  $\frac{231}{2048}$

$$DJ2 := -\frac{21}{32768} t_2^2 t_4^2 t_3^2 - \frac{1}{65536} t_4^3 t_5^3 t_2^2 t_3^2 t_1^2 + \frac{3}{131072} t_1^3 t_2^3 t_5^2 t_6^3 t_4^2 t_3 - \frac{11}{65536} t_4^2 t_6^2 t_1 t_2^3 t_5^2 + \frac{7}{4096} t_4^2 t_6 t_5 + \frac{447}{16384} t_1^2 t_6^3 t_1 t_2^3 t_5^2 t_3 + \frac{9}{32768} t_4^3 t_6^2 t_1 t_2^2 t_5^2 + \frac{13}{65536} t_4^2 t_6^3 t_2^2 t_3 t_5^2 + \frac{1}{4096} t_1^2 t_5^3 t_3^2 t_4^2 t_2 - \frac{1}{1024} t_1 t_3^2 t_5^2 t_4 - \frac{131072}{16384} t_1^2 t_3^2 t_5 t_2 - \frac{9}{16384} t_1^2 t_3^2 t_5 t_4 - \frac{3}{16384} t_1 t_3^3 t_5 t_2 + \frac{287}{65536} t_2 t_3^2 t_1 t_4 t_5 + \frac{1}{131072} t_4^2 t_5^3 t_3^3 t_3^4 t_1 t_6 + \frac{23}{65536} t_2 t_3 t_1^2 t_4^2 t_5 t_6 - \frac{19}{65536} t_2 t_3 t_1^2 t_4^2 t_5^2 t_6^2 + \frac{7}{1024} t_2 t_3 t_5 t_6 - \frac{139}{32768} t_3^2 t_6 t_1 t_2 t_4 - \frac{81}{65536} t_3^2 t_6^2 t_2 t_1 t_4 t_5 - \frac{9}{2048} t_3 t_6^2 t_1 t_4 t_5 + \frac{3}{262144} t_3^3 t_4^4 t_5^2 t_6^2 t_1 t_5^2 - \frac{1}{16384} t_4^2 t_5^3 t_2^2 t_3^3 - \frac{47}{131072} t_2^2 t_4^3 t_6^2 t_5 + \frac{1}{32768} t_1^3 t_2^3 t_5^3 t_3^2 t_6 - \frac{5}{65536} t_4 t_6^3 t_1 t_2^2 t_5^2 + \frac{9}{65536} t_4^2 t_6^2 t_1^2 t_2^2 t_3^2 + \frac{5}{65536} t_4^2 t_6^3 t_1^2 t_2^2 t_5 - \frac{1}{16384} t_4^2 t_6^2 t_1^2 t_2 t_3 + \frac{15}{65536} t_4^3 t_6^3 t_1 t_2 t_5 + \frac{5}{8192} t_4^2 t_6^3 t_1 t_2 t_5 + \frac{5}{65536} t_4^3 t_6^4 t_2 t_3 t_1 t_5^2 + \frac{35}{8192} t_4 t_6^2 t_2 + \frac{45}{131072} t_4^2 t_6^3 t_2^2 t_5 + \frac{289}{32768} t_2^2 t_4^2 t_5 t_6 + \frac{19}{262144} t_2^2 t_4^3 t_6^3 + \frac{3}{16384} t_1 t_3^3 t_5^2 t_2^2 - \frac{1}{131072} t_1^3 t_3^3 t_5^3 t_2^3 - \frac{1}{32768} t_1^2 t_3^3 t_5^3 t_2^2 - \frac{15}{65536} t_4^2 t_6^3 t_1^2 t_2^2 t_5 - \frac{31}{16384} t_4^2 t_6^2 t_1 t_5 + \frac{43}{65536} t_4^2 t_6^2 t_5^2 t_3^2 + \frac{85}{16384} t_4 t_6^2 t_5^2 t_3 + \frac{21}{16384} t_4^2 t_6 t_5^2 t_3 + \frac{9}{16384} t_4^2 t_6 t_1^2 t_2 - \frac{61}{16384} t_4 t_6 t_1 t_2 - \frac{277}{16384} t_4 t_6 t_2 t_3 + \frac{1}{16384} t_4^3 t_5^3 t_2^2 t_3^3 t_1 - \frac{5}{65536} t_4^3 t_5^3 t_2 t_3^2 t_1 + \frac{3}{32768} t_4^2 t_6^3 t_1^2 t_2 t_3 t_5 - \frac{75}{131072} t_4^2 t_6^2 t_1 t_2 t_5^2 - \frac{437}{262144} t_4^2 t_6^2 t_1 t_2^2 t_5^2 - \frac{31}{262144} t_4^3 t_6 t_1^2 t_2^2 t_5 t_3 - \frac{39}{262144} t_4^3 t_6^2 t_1^2 t_2^2 t_5^2 t_3 + \frac{5}{32768} t_4^3 t_6 t_1^2 t_2 t_5 + \frac{3}{65536} t_1^3 t_2 t_5^3 t_3^2 t_6^2 t_4 + \frac{17}{4096} t_1 t_4 t_5 t_6 - \frac{41}{32768} t_4 t_6^2 t_1 t_2 t_5 - \frac{3}{8192} t_4^2 t_6^2 t_3 t_1 - \frac{3}{8192} t_4^3 t_6^2 t_5^2 t_1 - \frac{9}{8192} t_4^2 t_6^3 t_5^2 t_3 - \frac{17}{16384} t_4 t_6^3 t_3 t_5 - \frac{3}{8192} t_4 t_6^2 t_3^2 t_2 + \frac{1}{8192} t_4^3 t_6 t_5 t_1 + \frac{1}{1024} t_4^2 t_6^2 t_5 t_3 + \frac{1}{65536} t_1^3 t_3^3 t_4 t_5^3 t_6^2 + \frac{5}{65536} t_1^3 t_5^2 t_2 t_3 t_4^2 t_6 + \frac{1}{65536} t_4^2 t_5^3 t_2 t_3^2 + \frac{89}{65536} t_4^2 t_5^2 t_2 t_3^2 t_1 - \frac{11}{65536} t_4^2 t_6 t_1 t_3^3 t_5^3 t_3^2 - \frac{3}{2048} t_2^2 t_3 t_5 + \frac{3}{32768} t_3^3 t_4^2 t_1^2 t_3^3 t_5^2 + \frac{13}{32768} t_1 t_5^3 t_3^3 t_4 t_6 t_2 + \frac{9}{65536} t_4^3 t_6 t_1^2 t_2^3 t_5^3 t_3^2 - \frac{5}{32768} t_4^3 t_6 t_1^2 t_2^2 t_5^3 t_3 - \frac{11}{131072} t_4^3 t_6^2 t_1^2 t_2 t_5^2 - \frac{149}{131072} t_4^2 t_6^3 t_2 t_3 t_1 t_5^2 - \frac{197}{262144} t_4^2 t_6^2 t_2^2 t_3^2 t_1 t_5 + \frac{57}{262144} t_4^2 t_6^3 t_2^2 t_3^2 t_1 t_5^2 - \frac{31}{131072} t_3^3 t_4^2 t_1 t_2^2 t_5^2 - \frac{3}{65536} t_1^3 t_2^3 t_5^2 t_3 t_4 - \frac{7}{32768} t_1^2 t_3^3 t_5^3 t_4^2 t_2^2 + \frac{3}{16384} t_1^2 t_3^3 t_5 t_2 t_4 + \frac{1}{32768} t_1^2 t_3^3 t_5^2 t_4^2 t_2 + \frac{1}{131072} t_1^3 t_3^2 t_5 t_2 t_4 - \frac{1}{65536} t_1^3 t_3^3 t_5^2 t_2 t_4^2 t_6 + \frac{3}{32768} t_1^2 t_5^3 t_3^3 t_4^2 t_6 t_2 - \frac{17}{16384} t_4 t_5^2 t_2 t_3^2 - \frac{11}{4096} t_4^2 t_5^2 t_1 t_3 - \frac{19}{4096} t_4 t_5^2 t_3^2 t_6 + \frac{5}{2048} t_3^2 t_5 t_6 + \frac{1}{8192} t_1^2 t_5 t_4 + \frac{1}{16384} t_3^4 t_4^3 t_5^2 t_6 t_2 t_1 + \frac{157}{131072} t_3^2 t_4^3 t_5 t_1 t_2 - \frac{11}{131072} t_1^3 t_3^3 t_5^2 t_3^3 t_4^2 t_6 - \frac{7}{131072} t_1^2 t_3^3 t_5^3 t_4 t_6^2 + \frac{7}{131072} t_1^3 t_3^3 t_5^3 t_4^2 t_6^2 - \frac{5}{32768} t_1 t_3^4 t_5^2 t_4 t_6 t_2 + \frac{5}{32768} t_1^2 t_4^4 t_5^2 t_4^2 t_6 t_2 + [...872 terms...] + \frac{1}{65536} t_1^3 t_6^2 t_2 t_4 t_5 - \frac{3}{32768} t_1^2 t_6^3 t_2 t_3 t_5 + \frac{1}{131072} t_1^3 t_6^2 t_2^2 t_3^2 t_4 + \frac{3}{131072} t_1^3 t_6^3 t_2^2 t_3^2 t_4 t_5 + \frac{5}{65536} t_1^3 t_6^2 t_2 t_3 t_4 + \frac{1}{32768} t_1^3 t_6^3 t_2 t_3 t_4 t_5 - \frac{1}{8192} t_1^3 t_6 t_2 t_4^2 t_5 - \frac{1}{65536} t_1^3 t_6^2 t_2 t_4^2 t_5^2 - \frac{1}{262144} t_5^3 t_6^4 t_3^3 t_4^4 t_1 t_3 + \frac{1}{262144} t_1^4 t_2^3 t_4 t_5^3 t_6^3 - \frac{5}{131072} t_2^2 t_4^4 t_6^3 t_3 t_1 + \frac{1}{65536} t_1^3 t_2^2 t_4 t_5^3 t_6^3 - \frac{1}{65536} t_1^2 t_3^4 t_5^3 t_2^3 t_4 t_6 + \frac{7}{16384} t_4 t_5^3 t_2^3 t_4 t_6 + \frac{3}{8192} t_4^2 t_5^3 t_1 t_2 t_6 - \frac{75}{65536} t_4^2 t_5^3 t_1 t_2^2 t_3 t_6 - \frac{7}{16384} t_4 t_5^2 t_3^2 t_6 t_2^2 + \frac{5}{16384} t_4 t_5^3 t_2^2 t_6^2 t_2^2 - \frac{53}{131072} t_2^2 t_4^4 t_3 t_5^2 t_1 + \frac{37}{65536} t_4^3 t_6^2 t_1 t_2 t_5 + \frac{3}{65536} t_4^3 t_6^3 t_1^2 t_2^2 t_3 t_5 + \frac{7}{262144} t_1^3 t_3^3 t_2^2 t_4^2 t_5 t_6 + \frac{3}{16384} t_1 t_3^2 t_6^2 t_5 + \frac{201}{65536} t_3 t_4^2 t_6^2 t_2 - \frac{7}{131072} t_1^4 t_2^2 t_5^2 t_3 t_4 + \frac{7}{262144} t_1^4 t_2^3 t_5^2 t_3^2 t_4 - \frac{1}{32768} t_1^3 t_2 t_5^3 t_6^3 t_3 t_4 - \frac{1}{131072} t_1^4 t_2^2 t_5^3 t_6^3 t_3 t_4 - \frac{5}{131072} t_1^3 t_2^3 t_5 t_6^2 t_4 + \frac{1}{8192} t_4 t_6^2 t_2^2 t_3^3 t_5^2 - \frac{77}{32768} t_2 t_4^2 t_5 + \frac{7}{131072} t_1^3 t_2^2 t_5^2 t_3^3 t_6 t_4 - \frac{5}{131072} t_1^3 t_2^2 t_5^3 t_3^3 t_6^2 t_4 - \frac{11}{131072} t_1^3 t_2 t_5^2 t_3^2 t_6 t_4 + \frac{1}{32768} t_3^3 t_4 t_1 t_2^2 t_6 - \frac{1}{65536} t_1^3 t_3^3 t_5^3 t_3^3 t_4^2 - \frac{27}{65536} t_3^3 t_4^3 t_6^2 t_2^2 t_1 t_5 - \frac{31}{8192} t_4 t_5^2 t_3 t_6^3 t_2 + \frac{3}{8192} t_1^2 t_2^2 t_4 t_6 + \frac{1}{65536} t_1^2 t_3^3 t_5^3 t_3^3 t_4 - \frac{507}{32768} t_1 t_3 t_4 t_5 - \frac{139}{16384} t_1 t_2 t_3 t_6 + \frac{1}{512} t_3^2 t_6^2 t_2 t_5 - \frac{9}{2048} t_3 t_6 t_1 t_4 + \frac{35}{2048} t_4 t_5 t_2 t_3 + \frac{3}{8192} t_4^2 t_5^2 t_1 t_6 - \frac{45}{8192} t_4 t_5^2 t_3 + \frac{1}{16384} t_1 t_2^2 t_3^2 t_6 + \frac{115}{65536} t_4 t_6 t_2^2 t_3 t_1 + \frac{13}{32768} t_4^2 t_6^2 t_1^2 t_2 t_5 - \frac{15}{32768} t_4 t_6^3 t_1 t_2 t_3 t_5 + \frac{7}{65536} t_3^3 t_4^3 t_3^3 t_1 t_5^2 t_6^2$$

$$\begin{aligned}
 & - \frac{1}{65536} t_1^3 t_2^3 t_4 t_5^2 t_6 - \frac{1}{4096} t_2^3 t_4^2 t_3^2 t_5 - \frac{19}{32768} t_1^2 t_6^2 t_5^2 + \frac{5}{131072} t_3^2 t_4^2 t_6^3 t_2^3 t_5^2 + \frac{5}{8192} t_3^3 t_4^3 t_5^2 t_2 t_1 \\
 & + \frac{13}{65536} t_1^2 t_5^3 t_3^3 t_2^2 t_4 t_6 - \frac{89}{65536} t_3^2 t_4^2 t_5^2 + \frac{3}{32768} t_2 t_4^4 t_6^2 t_5^2 t_1 - \frac{1}{32768} t_2 t_4^4 t_6 t_5 t_1 + \frac{19}{65536} t_2 t_4^3 t_6^2 t_5^2 \\
 & - \frac{1}{65536} t_4^3 t_6^3 t_1 t_2^2 t_5^2 t_3 - \frac{47}{16384} t_4 t_5^2 t_2^2 t_6 - \frac{3}{65536} t_1^2 t_2^3 t_3^3 t_6 t_3 - \frac{7}{131072} t_2^3 t_4^4 t_6 t_5^3 t_1 t_3^2 + \frac{1}{16384} t_2^2 t_4^4 t_6 t_5^3 t_1 t_3 \\
 & + \frac{9}{131072} t_2^3 t_4^3 t_6^2 t_5^3 t_3^3 - \frac{3}{32768} t_1^2 t_5^3 t_4^2 t_6^3 t_2 t_3 + \frac{3}{131072} t_1^4 t_3^3 t_5^2 t_2 t_6 t_4 - \frac{1}{65536} t_2^3 t_4^3 t_3 t_5^3 t_6^3 t_1 \\
 & - \frac{1}{32768} t_1^3 t_4^4 t_5^3 t_2^2 t_4 t_6 + \frac{13}{131072} t_1^3 t_3^3 t_5^2 t_2 t_6 + \frac{1}{131072} t_1^4 t_3^3 t_5^3 t_2^3 t_4 + \frac{1}{32768} t_1^2 t_3^4 t_5^3 t_2^2 t_6 + \frac{1}{131072} t_1^3 t_3^4 t_5^3 t_2^3 \\
 & - \frac{1}{131072} t_1^4 t_3^4 t_5^3 t_2^3 t_4 t_6 + \frac{27}{8192} t_2^2 t_4^2 t_1 t_5 + \frac{15}{65536} t_2^3 t_4^2 t_5^2 t_3 - \frac{17}{32768} t_2^2 t_4^2 t_5^3 t_6 - \frac{1}{4096} t_2^2 t_4^3 t_6^2 t_5^3 \\
 & + \frac{1}{131072} t_1^4 t_2^2 t_5^3 t_6^2 t_4 + \frac{1}{32768} t_1^3 t_2 t_5^3 t_6^2 t_4 - \frac{93}{131072} t_3 t_4^2 t_6^2 t_2^2 t_5 + \frac{35}{2048} t_3 t_6^2 t_5 + \frac{1}{1024} t_3^2 t_6 t_2 - \frac{11}{8192} t_4 t_5^2 t_6 \\
 & + \frac{47}{8192} t_4^2 t_5 t_1 + \frac{197}{8192} t_4 t_5 t_3 t_6 - \frac{7}{16384} t_2 t_4^3 t_6 t_5 + \frac{13}{8192} t_2^2 t_4^2 t_6 t_1 + \frac{9}{262144} t_2^3 t_4^3 t_3^3 t_5^2 t_6 - \frac{1}{4096} t_3 t_4^3 t_6^2 t_5 t_2 \\
 & + \frac{9}{16384} t_2^3 t_5 t_4 t_3 + \frac{21}{32768} t_2^2 t_4^3 t_6 t_5^2 + \frac{1}{4096} t_2^3 t_4^3 t_3^2 t_1 t_5 + \frac{19}{32768} t_2^2 t_4^3 t_5^2 t_1 - \frac{3}{131072} t_3^2 t_4^2 t_6^3 t_2^2 t_5 \\
 & + \frac{13}{131072} t_3^2 t_4^3 t_6^2 t_2^2 t_1 + \frac{3}{65536} t_1^2 t_2^3 t_5^3 t_3^2 t_6^2
 \end{aligned}$$

$$\text{gamma} := \frac{231}{2048}$$

> unassign('e');dj2:=subs([seq(t[k]=e[k],k=1..n)],DJ2):det2:=ecliffit(dj2);gamma:=ecliffsubs(det2,zeta):"gamma",gamma,eval

$$\begin{aligned}
 \text{det2} := & - \frac{281}{8192} e_3 e_6 - \frac{13}{8192} e_1 e_5 + \frac{139}{8192} e_1 e_2 e_3 e_5 - \frac{49}{8192} e_5 e_6 - \frac{155}{8192} e_2 e_6 - \frac{45}{8192} e_1 e_2 e_4 e_5 + \frac{27}{8192} e_2 e_3 e_1 e_4 e_5 e_6 - \frac{69}{8192} e_4 e_6 e \\
 & - \frac{263}{8192} e_4 e_6 e_2 e_3 + \frac{81}{8192} e_1 e_4 e_5 e_6 + \frac{835}{8192} - \frac{9}{8192} e_1 e_2 e_3 e_4 - \frac{119}{8192} e_1 e_2 e_5 e_6 + \frac{181}{8192} e_1 e_3 e_5 e_6 + \frac{155}{8192} e_3 e_4 - \frac{35}{8192} e_1 e_2 \\
 & - \frac{27}{8192} e_1 e_3 + \frac{157}{8192} e_1 e_4 + \frac{41}{8192} e_2 e_3 - \frac{93}{8192} e_2 e_4 - \frac{5}{8192} e_1 e_6 - \frac{243}{8192} e_2 e_5 - \frac{135}{8192} e_1 e_3 e_4 e_5 - \frac{121}{8192} e_1 e_2 e_3 e_6 - \frac{7}{8192} e_3 e_6 e_1 e \\
 & + \frac{245}{8192} e_4 e_5 e_2 e_3 + \frac{141}{8192} e_4 e_5 - \frac{89}{8192} e_3 e_5 - \frac{123}{8192} e_4 e_6 - \frac{265}{8192} e_4 e_5 e_2 e_6 + \frac{203}{8192} e_4 e_5 e_3 e_6 - \frac{59}{8192} e_2 e_3 e_5 e_6
 \end{aligned}$$

$$\text{"gamma", } \frac{835}{8192}, 0.1019287109$$

$$\text{"difference", } 0.01086425781$$

> unassign('x'):read ("/home/ph/maple/G"||n||".m");nops(G);for i to 10 do op(i,G) od;

1024

1

x<sub>13</sub> x<sub>12</sub> x<sub>10</sub> x<sub>8</sub> x<sub>7</sub> x<sub>6</sub> x<sub>5</sub> x<sub>3</sub> x<sub>2</sub> x<sub>1</sub>

x<sub>11</sub> x<sub>9</sub> x<sub>8</sub> x<sub>5</sub> x<sub>2</sub>

x<sub>15</sub> x<sub>14</sub> x<sub>12</sub> x<sub>11</sub> x<sub>9</sub> x<sub>7</sub> x<sub>6</sub> x<sub>2</sub> x<sub>1</sub>

x<sub>13</sub> x<sub>12</sub> x<sub>11</sub> x<sub>9</sub> x<sub>8</sub> x<sub>7</sub> x<sub>6</sub> x<sub>4</sub> x<sub>2</sub>

x<sub>15</sub> x<sub>10</sub> x<sub>7</sub> x<sub>5</sub> x<sub>4</sub> x<sub>2</sub> x<sub>1</sub>

x<sub>12</sub> x<sub>11</sub> x<sub>10</sub> x<sub>7</sub> x<sub>5</sub> x<sub>4</sub> x<sub>2</sub> x<sub>1</sub>

x<sub>12</sub> x<sub>11</sub> x<sub>10</sub> x<sub>9</sub> x<sub>4</sub> x<sub>3</sub> x<sub>2</sub> x<sub>1</sub>

x<sub>12</sub> x<sub>11</sub> x<sub>10</sub> x<sub>9</sub> x<sub>8</sub> x<sub>3</sub> x<sub>2</sub>

x<sub>15</sub> x<sub>13</sub> x<sub>9</sub> x<sub>3</sub> x<sub>1</sub>

> gxc:=CORE(G,J2-AA,-evalm(psi&\*Del2),true):

$$\{, \frac{231}{2048}$$

{1, 2, 3, 5, 6, 7, 8, 10, 12, 13}, 0

