

```

poincare:~$ snap
pari initialized
snap 1.11.3
1. : r c 5 4
1. m004(,): p vol
Volume is: 2.029883212819307250042405109
1. m004(,): p hom
Z
1. m004(,): co tr
Trace field:  $x^2-x+1$  [0,1] -3 R(1) =  $0.500000000+0.866025404*I$ 
1. m004(,): co inv
Invariant trace field:  $x^2-x+1$  [0,1] -3 R(1) =
 $0.500000000+0.866025404*I$ 
1. m004(,): p arith
Invariant trace field:  $x^2-x+1$  [0,1] -3 R(1) =
 $0.500000000+0.866025404*I$ 
Integer traces: YES
Invariant quaternion algebra: (32*x-16, -12*x+12)
Ramification: none (manifold has cusps)
Arithmetic: YES

1. m004(,): su 5 1
solution type: geometric
1. m004(5,1): p hom
Z/5
1. m004(5,1): co in
Invariant trace field:  $x^4-x-1$  [2,1] -283 R(3) =
 $-0.248126063+1.03398206*I$ 
1. m004(5,1): co tr
Trace field:  $x^4-x-1$  [2,1] -283 R(3) =  $-0.248126063+1.03398206*I$ 
1. m004(5,1): p arith
Invariant trace field:  $x^4-x-1$  [2,1] -283 R(3) =
 $-0.248126063+1.03398206*I$ 
Integer traces: YES
Invariant quaternion algebra: ( $x^3+2*x^2-x-4$ ,  $4*x^3-9*x^2+6$ )
Real ramification: [1,2]
Finite ramification: none
Arithmetic: YES

1. m004(,): su 1 2
solution type: geometric
1. m004(1,2): p hom

1. m004(1,2): co in
Invariant trace field:  $x^7-2*x^6-3*x^5+3*x^4+5*x^3-x^2-3*x+1$  [5,1]
-7215127 R(6) =  $-0.833411169+0.676655426*I$ 
1. m004(1,2): p arith
Invariant trace field:  $x^7-2*x^6-3*x^5+3*x^4+5*x^3-x^2-3*x+1$  [5,1]
-7215127 R(6) =  $-0.833411169+0.676655426*I$ 

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Integer traces: YES
Invariant quaternion algebra: $(-x^6+x^5+5*x^4-7*x^2-6*x+3, x^6-3*x^5-x^4+7*x^3-2*x^2-3*x+1)$
Real ramification: [2,3,4,5]
Finite ramification: none
Arithmetic: NO

1. m004(5,2): p vol
Volume is: 1.529477329430026262824928630

1. m004(5,2): p hom
Z/5

1. m004(5,2): co in
Invariant trace field: $x^7-x^6-2*x^5+5*x^4-6*x^2+x+1$ [5,1] -3998639
 $R(6) = 1.04936717+1.13474259*I$

1. m004(5,2): p arith
Invariant trace field: $x^7-x^6-2*x^5+5*x^4-6*x^2+x+1$ [5,1] -3998639
 $R(6) = 1.04936717+1.13474259*I$

Integer traces: YES
Invariant quaternion algebra: $(-3*x^6+6*x^5-x^4-13*x^3+12*x^2+2*x-3, 6*x^6-14*x^5+3*x^4+26*x^3-28*x^2+x+4)$
Real ramification: [1,3,4,5]
Finite ramification: none
Arithmetic: NO

1. m004(6,1): p vol
Volume is: 1.284485300468354442460337085

1. m004(6,1): p hom
Z/6

1. m004(6,1): co in
Invariant trace field: $x^3+2*x-1$ [1,1] -59 $R(2) = -0.226698826+1.46771151*I$

1. m004(6,1): co tr
Trace field: $x^6+x^4-2*x^2-4$ [2,2] 222784 $R(-3) = -0.334141203-1.20047236*I$

1. m004(6,1): p arith
Invariant trace field: $x^3+2*x-1$ [1,1] -59 $R(2) = -0.226698826+1.46771151*I$

Integer traces: YES
Invariant quaternion algebra: $(x^2-x-1, -6*x^2+2*x)$
Real ramification: [1]
Finite ramification:
[2, [0,1,1]~, 1,2, [1,0,1]~]
Arithmetic: YES

m004(,): su 7 2

solution type: geometric

1. m004(7,2): co in
Invariant trace field: $x^7-x^6-x^5+4*x^4-2*x^3-4*x^2+x+1$ [5,1]
 $-3685907 R(6) = 0.857072102+1.27443959*I$

1. m004(7,2): p arith
 Invariant trace field: $x^7-x^6-x^5+4x^4-2x^3-4x^2+x+1$ [5,1]
 $-3685907 R(6) = 0.857072102+1.27443959*I$
 Integer traces: YES
 Invariant quaternion algebra:
 $(-11x^6+20x^5-4x^4-42x^3+55x^2+3x-17,$
 $61x^6-105x^5+14x^4+231x^3-287x^2-31x+82)$
 Real ramification: [1,3,4,5]
 Finite ramification: none
 Arithmetic: NO

m004(9,1): co in
 Invariant trace field: $x^7-2x^6+4x^5-3x^4-3x-1$ [3,2] 3752872 R(5)
 $= 0.587492310+1.55016699*I$
 1. m004(9,1): co tr
 Trace field: $x^7-2x^6+4x^5-3x^4-3x-1$ [3,2] 3752872 R(5) =
 $0.587492310+1.55016699*I$
 1. m004(9,1): p arith
 Invariant trace field: $x^7-2x^6+4x^5-3x^4-3x-1$ [3,2] 3752872 R(5)
 $= 0.587492310+1.55016699*I$
 Integer traces: YES
 Invariant quaternion algebra: $(x^4-2x^3+3x^2-2x-3,$
 $2x^6-4x^5+6x^4-5x^3-3x^2+2x)$
 Real ramification: [1,2,3]
 Finite ramification:
 $[2, [0,1,0,1,1,0]] \sim 2,1, [1,1,1,0,1,0,1] \sim$
 Arithmetic: NO

1. m004(5,0): p vol
 Volume is: 0.9372068547605225061424981299
 1. m004(5,0): p hom
 Z/5
 1. m004(5,0): co in
 Invariant trace field: x^4-x^3+2x-1 [2,1] -275 R(3) =
 $0.809016994+0.981593343*I$
 1. m004(5,0): p arith
 Invariant trace field: x^4-x^3+2x-1 [2,1] -275 R(3) =
 $0.809016994+0.981593343*I$
 Integer traces: YES
 Invariant quaternion algebra: $(-2x^3+4x^2+3x-6, -2x^3+x^2+2x-3)$
 Real ramification: [1,2]
 Finite ramification: none
 Arithmetic: YES
 Borel Regulator: not computed (shape field required)
 1. m004(5,0): co tr
 Trace field: x^4-x^3+2x-1 [2,1] -275 R(3) = $0.809016994+0.981593343*I$

1. m004(4,0): p hom

Z/4

1. m004(4,0): co in

Invariant trace field: x^2-x+1 [0,1] -3 R(1) =
0.500000000+0.866025404*I

1. m004(4,0): co tr

Trace field: x^4+2*x^2+4 [0,2] 576 R(1) = -0.707106781+1.22474487*I

1. m004(4,0): p arith

Invariant trace field: x^2-x+1 [0,1] -3 R(1) =
0.500000000+0.866025404*I

Integer traces: YES

Invariant quaternion algebra: (5*x-1, 2*x+2)

Real ramification: []

Finite ramification:

[2, [2,0]~ , 1, 2, [1,0]~]

[3, [2,1]~ , 2, 1, [-1,1]~]

Arithmetic: YES

1. m004(6,0): p vol

Volume is: 1.221287458902958686739471353

1. m004(6,0): co in

Invariant trace field: x^2+1 [0,1] -4 R(1) = 0.000000000+1.000000000*I

1. m004(6,0): co tr

Trace field: x^4-x^2+1 [0,2] 144 R(1) = -0.866025404+0.500000000*I

1. m004(6,0): p arith

Invariant trace field: x^2+1 [0,1] -4 R(1) = 0.000000000+1.000000000*I

Integer traces: YES

Invariant quaternion algebra: (8*x-4, 6*x+6)

Real ramification: []

Finite ramification:

[2, [1,1]~ , 2, 1, [1,1]~]

[3, [3,0]~ , 1, 2, [1,0]~]

Arithmetic: YES

1. m015(,): p hom

Z

1. m015(,): co in

Invariant trace field: x^3-x^2+1 [1,1] -23 R(-2) =
0.877438833-0.744861767*I

1. m015(,): co tr

Trace field: x^3-x^2+1 [1,1] -23 R(-2) = 0.877438833-0.744861767*I

1. m015(,): p arith

Invariant trace field: x^3-x^2+1 [1,1] -23 R(-2) =
0.877438833-0.744861767*I

Integer traces: YES

Invariant quaternion algebra: (80*x^2-48, -48*x^2+32*x+52)

Ramification: none (manifold has cusps)

Arithmetic: NO

1. m015(5,1): co in
Invariant trace field: $x^5-x^4-x^3+2x^2-x-1$ [3,1] -4903 R(-4) =
 $0.685154314-0.871407151*I$
1. m015(5,1): co tr
Trace field: $x^5-x^4-x^3+2x^2-x-1$ [3,1] -4903 R(-4) =
 $0.685154314-0.871407151*I$
1. m015(5,1): p arith
Invariant trace field: $x^5-x^4-x^3+2x^2-x-1$ [3,1] -4903 R(-4) =
 $0.685154314-0.871407151*I$
Integer traces: YES
Invariant quaternion algebra: $(-4x^4+3x^3+9x^2-5x-6,$
 $3x^4-5x^3-7x^2+8x+4)$
Real ramification: [1,2,3]
Finite ramification:
[13, [-2,1,0,0,0]~, 1,1, [-3,4,1,4,2]~]
Arithmetic: YES

1. m015(5,2): co in
Invariant trace field: $x^9-x^8-5x^7+5x^6+6x^5-8x^4-x^3+4x^2-x-1$
[5,2] 2016798041 R(-6) = $0.526792654-0.568093776*I$
1. m015(5,2): p arith
Invariant trace field: $x^9-x^8-5x^7+5x^6+6x^5-8x^4-x^3+4x^2-x-1$
[5,2] 2016798041 R(-6) = $0.526792654-0.568093776*I$
Integer traces: YES
Invariant quaternion algebra:
 $(-2x^8+11x^7+10x^6-59x^5-18x^4+87x^3+14x^2-43x-16,$
 $-12x^8-3x^7+65x^6+22x^5-92x^4-27x^3+47x^2+19x-1)$
Real ramification: [1,2,3,4,5]
Finite ramification:
[5, [-2,0,1,0,0,0,0,0]~, 1,1, [0,-2,1,-1,2,-2,1,-1,2]~]
Arithmetic: NO
Borel Regulator: not computed (shape field required)

1. m015(5,3): co inv
Invariant trace field:
 $x^{14}-7x^{12}-7x^{11}+18x^{10}+34x^9-11x^8-59x^7-16x^6+46x^5+21x^4-1$
 $6x^3-8x^2+2x+1$ [10,2] 1126531280626081697 R(-12) =
 $-0.920707136-1.12990873*I$
1. m015(5,3): p hom
Z/11
1. m015(5,3): p arith
Invariant trace field:
 $x^{14}-7x^{12}-7x^{11}+18x^{10}+34x^9-11x^8-59x^7-16x^6+46x^5+21x^4-1$
 $6x^3-8x^2+2x+1$ [10,2] 1126531280626081697 R(-12) =
 $-0.920707136-1.12990873*I$
Integer traces: YES
Invariant quaternion algebra:
 $(2x^{13}-16x^{11}-11x^{10}+46x^9+66x^8-57x^7-132x^6+19x^5+133x^4-64$
 $x^2+2x+9,$
 $8x^{13}-5x^{12}-52x^{11}-25x^{10}+155x^9+178x^8-182x^7-357x^6+63x^5+3$

$16x^4+8x^3-126x^2-3x+17$
Real ramification: [2,3,5,6,7,8,9,10]
Finite ramification: none
Arithmetic: NO

1. m015(8,1): co in
Invariant trace field: x^4-x^2-3x-2 [2,1] -2151 R(-3) =
-0.529830306-1.09374024*I
1. m015(8,1): co tr
Trace field: $x^8+4x^6+20x^4-40x^2+16$ [4,2] 18951376896 R(-5) =
-1.12209314-2.00761738*I
1. m015(8,1): p hom
Z/10
1. m015(8,1): p arith
Invariant trace field: x^4-x^2-3x-2 [2,1] -2151 R(-3) =
-0.529830306-1.09374024*I
Integer traces: NO
Invariant quaternion algebra: $(1/4x^3-1/2x^2+3/4x-9/4,$
 $-15/4x^3-9/2x^2+59/4x+39/4)$
Real ramification: [1,2]
Finite ramification: none
Arithmetic: NO

1. m015(11,1): co in
Invariant trace field: $x^9-x^8-2x^6+3x^5-5x^4+5x^3-x^2+1$ [3,3]
-3285809699 R(-6) = 0.329194400-0.650117690*I
1. m015(11,1): co tr
Trace field: $x^9-x^8-2x^6+3x^5-5x^4+5x^3-x^2+1$ [3,3] -3285809699
R(-6) = 0.329194400-0.650117690*I
1. m015(11,1): p arith
Invariant trace fie

Ild: $x^9-x^8-2x^6+3x^5-5x^4+5x^3-x^2+1$ [3,3] -3285809699 R(-6) =
0.329194400-0.650117690*I
Integer traces: YES
Invariant quaternion algebra: $(-x^8+x^5-2x^4+3x^3+x^2,$
 $11x^8-6x^7-7x^6-24x^5+23x^4-36x^3+33x^2+22x-2)$
Real ramification: [1,2,3]
Finite ramification:
[181, [-2,1,0,0,0,0,0,0,0]~, 1,1, [-85,54,-18,20,8,10,-7,14,34]~]
Arithmetic: NO