MACAULAY2 SESSION IN IBADAN

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Macaulay2, version 1.9.2
with packages: ConwayPolynomials, Elimination, IntegralClosure, LLLBases,
               PrimaryDecomposition, ReesAlgebra, TangentCone

i1 : QQ[x,y,t]

o1 = QQ[x, y, t]

o1 : PolynomialRing

i2 : f=t^3-3*t^2+2*t

      3     2
o2 = t  - 3t  + 2t

o2 : QQ[x, y, t]

i3 : g=t^3+2*t^2-3*t

      3     2
o3 = t  + 2t  - 3t

o3 : QQ[x, y, t]

i4 : I=ideal(f-x,g-y)

              3     2            3     2
o4 = ideal (t  - 3t  - x + 2t, t  + 2t  - y - 3t)

o4 : Ideal of QQ[x, y, t]

i5 : E=eliminate({t},I)

             3     2        2    3      2              2
o5 = ideal(x  - 3x y + 3x*y  - y  + 60x  + 55x*y + 10y )

o5 : Ideal of QQ[x, y, t]

i6 : F=oo_0
```

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      3     2        2    3      2              2
o6 = x  - 3x y + 3x*y  - y  + 60x  + 55x*y + 10y

o6 : QQ[x, y, t]

i7 : support(F)

o7 = {x, y}

o7 : List

i8 : F=sub(F,QQ[support(F)])

      3     2        2    3      2              2
o8 = x  - 3x y + 3x*y  - y  + 60x  + 55x*y + 10y

o8 : QQ[x, y]

i9 : loadPackage("Polyhedra")

o9 = Polyhedra

o9 : Package

i10 : P=newtonPolytope(F)

o10 = {ambient dimension => 2           }
       dimension of lineality space => 0
       dimension of polyhedron => 2
       number of facets => 4
       number of rays => 0
       number of vertices => 4

o10 : Polyhedron

i11 : interiorLatticePoints(P)

o11 = {}

o11 : List

i12 : latticePoints(P)

o12 = {| 0 |, | 0 |, | 1 |, | 1 |, | 2 |, | 2 |, | 3 |}
       | 2 |  | 3 |  | 1 |  | 2 |  | 0 |  | 1 |  | 0 |

o12 : List
```

```
i13 : vertices(P)

o13 = | 2 3 0 0 |
      | 0 0 2 3 |

               2        4
o13 : Matrix QQ  <--- QQ

i14 : halfspaces(P)

o14 = (| -1 0  |, | 0  |)
       | 0  -1 |  | 0  |
       | -1 -1 |  | -2 |
       | 1  1  |  | 3  |

o14 : Sequence

i15 : help Polyhedra

o15 = Polyhedra -- for computations with convex polyhedra, cones, and fans
      ************************************************************************

      Description
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      A rational convex "Polyhedron" is the intersection of finitely many
      affine half-spaces over "QQ" or equivalently, the convex hull of a finite
      set of vertices and rays.  A rational convex polyhedral "Cone" is the
      intersection of finitely many linear half-spaces over "QQ" or

                                    .
                                    .
                                    .

i16 : factor(60*x^2+55*x*y+10*y^2)


o16 = (3x + 2y)(4x + y)(5)

o16 : Expression of class Product
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