

```

function Unproj(C,D)
P:=ProjectiveClosure(Ambient(C));
R<w,x,y,z>:=PolynomialRing(BaseField(P),[3,1,1,1]);
h:=hom<CoordinateRing(P)->R[[x,y,z]]>;
a:=h(DefiningEquation(ProjectiveClosure(C)));
D:=h(DefiningEquation(ProjectiveClosure(D)));
X:=w^2-D;
A:=Scheme(ProjectiveSpace(R),[X,a]);
p:=PrimaryComponents(A);
if #p eq 1 then print "Error: pullback of curve is irreducible";end if;
if #p eq 2 then b:=DefiningEquations(p[1])[1]-w;end if;
if #p eq 4 then b:=DefiningEquations(p[1])[1]-w+DefiningEquations(p[3])[1]-w;end if;
c:=(-D+b^2) div (4*a);
return a*w^2+b*w+c;
end function;

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//D5E7E7

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A<x,y>:=AffineSpace(Rationals(),2);
L:=[LinearSystem(A,3),LinearSystem(A,3),LinearSystem(A,1),LinearSystem(A,1)];
P:=[A![0,0],A![1,0],A![2,1]];
M:=[[[1,1],[1],[2,1,1],[1,1,0]],\
[[1,1],[1],[1,1,0],[2,1,1]],\
[[0,0],[1],[1,0,0],[1,0,0]],\
[[1,0],[0],[1,0,0],[1,0,0]]\
];
T:=[[[1,0]],[],[[1,2],[0,1]],[[0,1]]];
S:=ParSch(L,P,M,T,[],[[1,3,4,7]],2);
//Dimension(S);
R:=Ambient(S);
S1:=Scheme(S,[R.2-2]);
PointsOverSplittingField(S1);
P:=[A![0,0],A![1,0],A![2,1],A![22/7,2]];
M:=[[2,2],[2],[3,2,1],[3,2,1]];
T:=[[[1,0]],[],[[1,2],[0,1]],[[1,28/23],[0,1]]];
J:=LinSys(LinearSystem(A,6),P,M,T);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);

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//D7D6D6

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A<x,y>:=AffineSpace(Rationals(),2);
L:=[LinearSystem(A,3),LinearSystem(A,2),LinearSystem(A,1)];
P:=[A![0,0],A![0,0],A![1,0],A![2,1]];

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M:=[[2,1,1],[0,0],[1],[1,1],[1,1]],\
    [[0,0,0],[1,1],[0],[1,1],[1,1]],\
    [[0,0,0],[0,0],[1],[1,0],[1,0]]\
];
T:=[[1,-1],[0,1]],[[1,0]],[],[[1,0]],[]];
S:=ParSch(L,P,M,T,[],[1,6,7,9],0);
Dimension(S);
PointsOverSplittingField(S);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,0],A![1,0],A![2,1],A![4/5, -1/5]];
M:=[[3,1,1],[3,1],[2],[3,2],[3,2]];
T:=[[1,-1],[0,1]],[[1,0]],[],[[1,0]],[[1,-2/3]]];
J:=LinSys(L,P,M,T);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);

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//E6D8D5

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K:=Rationals();
A<x,y>:=AffineSpace(K,2);
L:=[LinearSystem(A,3),LinearSystem(A,3)];
P:=[A![0,0],A![0,1],A![2,1]];
M:=[[1,1,1],[1,1,1],[2,1,1]],\
    [[1,1,1],[2,1,1],[1,0,0]]\
];
T:=[[1,0],[1,0]],[],[],[[1,1],[0,1]]];
S:=ParSch(L,P,M,T,[],[],0);
Dimension(S);
PointsOverSplittingField(S);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1],A![2,1]];
M:=[[2,2,2],[3,2,2],[3,1,1]];
T:=[[1,0],[1,0]],[[1,1/2],[1,-3/16]],[[1,1],[0,1]]];
J:=LinSys(L,P,M,T);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);

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//E6D13

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A<x,y>:=AffineSpace(Rationals(),2);
L:=[LinearSystem(A,6),LinearSystem(A,3),LinearSystem(A,2)];
P:=[A![0,0],A![0,1]];
M:=[[2,2,2],[3,2,2,2,2,1,1]],\

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[[1,1,1],[2,1,1,1,1,0,0]],\
[[1,1,0],[1,1,1,1,1,1,0]]\
];
T:=[[1,0],[1,0]],[[1,0],[1,1],[],[],[0,1]];
S:=ParSch(L,P,M,T,[],[2]);
Dimension(S);
R:=Ambient(S);
S1:=Scheme(S,[R.2-2]);
Dimension(S1);
PointsOverSplittingField(S1);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1]];
M:=[[2,2,2],[3,2,2,2,1,1]];
T:=[[1,0],[1,0]],[[1,0],[1,1],[1,2],[1,25/3],[1,166/3],[0,1]];
J:=LinSys(L,P,M,T);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);

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//E6E6D7

```

K:=Rationals();
A<x,y>:=AffineSpace(K,2);
L:=[LinearSystem(A,6),LinearSystem(A,2),LinearSystem(A,1)];
P:=[A![0,0],A![0,2],A![1,1]];
M:=[[[2,2,2],[3,1,1,1],[3,2,1,1]],\
[[1,1,0],[1,1,0,0],[1,1,1,0]],\
[[0,0,0],[1,0,0,0],[1,1,0,0]]
];
T:=[[1,0],[1,0]],[[1,0],[0,1],[0,1]],[[0,1],[0,1]];
S:=ParSch(L,P,M,T,[],[2]);
Dimension(S);
PointsOverSplittingField(S);
R<r1>:=PolynomialRing(Rationals());
K<r1>:=NumberField(r1^2 - 33/73*r1 + 9/292);
A<x,y>:=AffineSpace(K,2);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,2],A![1,1]];
M:=[[2,2,2],[3,1,1,1],[3,2,1,1]];
T:=[[1,0],[1,0]],[[1,0],[0,1],[0,1]],[[1,146/9*r1 - 14/3],[1, 1460/27*r1 - 182/9],[0,1]];
J:=LinSys(L,P,M,T);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);

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//E6E8D5

```
K:=Rationals();
A<x,y>:=AffineSpace(K,2);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1],A![1,2]];
M:=[[2,2,2],[3,2,1,1],[3,1,1]];
T:=[[1,0],[1,0]],[[1,0],[0,1],[1,0]],[[1,0,1]];
S:=ParSch(L,P,M,T,[],[],0);
Dimension(S);
PointsOverSplittingField(S);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1],A![1,2]];
M:=[[2,2,2],[3,2,1,1],[3,1,1]];
T:=[[1,0],[1,0]],[[1,0],[0,1],[1,0]],[[1,7/6],[0,1]];
J:=LinSys(L,P,M,T);
Factorization(Sections(J)[1]);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);
```

//E7D6D6

```
A<x,y>:=AffineSpace(Rationals(),2);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1],A![1,2]];
M:=[[3,2,1],[3,2],[3,2]];
T:=[[1,0],[1,0]],[[1,0]],[];
S:=ParSch(L,P,M,T,[],[],0);
PointsOverSplittingField(S);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1],A![1,2]];
M:=[[3,2,1],[3,2],[3,2]];
T:=[[1,0],[1,0]],[[1,0]],[[1,2]];
J:=LinSys(L,P,M,T);
Factorization(Sections(J)[1]);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);
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//E7D12

```
K:=Rationals();
A<x,y>:=AffineSpace(K,2);
L:=LinearSystem(A,6);
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P:=[A![0,0],A![0,1]];
M:=[[[3,2,1],[3,2,2,2,2]]];
T:=[[[1,0],[1,0]],[[1,0],[1,1],[1,1],[]]];
S:=ParSch(L,P,M,T,[],[],0);
Dimension(S);
PointsOverSplittingField(S);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1]];
M:=[[[3,2,1],[3,2,2,2,2]]];
T:=[[[1,0],[1,0]],[[1,0],[1,1],[1,1],[1,1]]];
J:=LinSys(L,P,M,T);
Factorization(Sections(J)[1]);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);

```

//E7E6D6

```

K:=Rationals();
A<x,y>:=AffineSpace(K,2);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1]];
M:=[[[3,2,1],[3,1,1,1],[3,2]]];
T:=[[[1,0],[1,0]],[[1,0],[0,1],[0,1],[]]];
S:=ParSch(L,P,M,T,[],[[1,4,8]],0);
//Dimension(S);
R:=Ambient(S);
S1:=Scheme(S,[R.1-1,R.2-2]);
Dimension(S1);
PointsOverSplittingField(S1);
L:=LinearSystem(A,6);
P:=[A![0,0],A![0,1],A![1,2]];
M:=[[[3,2,1],[3,1,1,1],[3,2]]];
T:=[[[1,0],[1,0]],[[1,0],[0,1],[0,1],[1,2]]];
J:=LinSys(L,P,M,T);
Factorization(Sections(J)[1]);
D:=Curve(A,Sections(J)[1]);
[ResolutionGraph(D,P[i]):i in [1..#P]];
C:=Curve(A,y^2);
Unproj(C,D);

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