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| 主専攻実習（定理証明班） |
| 第二回課題レポート |
| 担当：森継 修一 |

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| 知識情報システム主専攻 201611502　　久保川一良  2018年10月15日 |

* 接続環境
  + 自分のローカル環境にReduceをインストールして利用した
    - 使用したPCのスペックについて： https://bit.ly/2Cg7hqb

username@my\_computer:~ [HH:MM:SS]

$ lsb\_release -a

No LSB modules are available.

Distributor ID: Ubuntu

Description: Ubuntu 16.04.5 LTS

Release: 16.04

Codename: xenial

username@my\_computer:~ [HH:MM:SS]

$ reduce # alias reduce='redcsl -v -w -k 4000 --nogui'

Codemist Standard Lisp revision 4765 for linux-gnu:x86\_64: Sep 19 2018

Created: Wed Sep 19 15:57:15 2018

Reduce (Free CSL version, revision 4765), 19-Sep-18 ...

Memory allocation: 4168 Mbytes

There are 8 processors available

* 入力ファイル

%-----------------------------------------------------------------------

% Groebner Bassis Computation (in detail + loop count mutual reduction)

%-----------------------------------------------------------------------

load\_package groebner$

torder({x, y, z}, lex)$

f1:=x^2+y\*z-2;

f2:=y^2+x\*z-3;

f3:=x\*y+z^2-5;

%-----------------------------------------------------------------------

%% step (ii)-1 G={f1, f2, f3}

s12:=gspoly(f1, f2);

f4:=preduce(s12, {f1, f2, f3});

%-----------------------------------------------------------------------

%%% add new func(f4) to G\_group

%%% G={f1, f2, f3, f4}

s13:=gspoly(f1, f3);

f5:=preduce(s13, {f1, f2, f3, f4});

%-----------------------------------------------------------------------

%%% add new func(f5) to G\_group

%%% G={f1, f2, f3, f4, f5}

s23:=gspoly(f2, f3);

f6:=preduce(s23, {f1, f2, f3, f4, f5});

%-----------------------------------------------------------------------

%%% add new func(f6) to G\_group

%%% G={f1, f2, f3, f4, f5, f6}

%-----------------------------------------------------------------------

%% step (ii)-2 G={f1, f2, f3, f4, f5, f6}

s14:=gspoly(f1, f4);

f7:=preduce(s14, {f1, f2, f3, f4, f5, f6});

%-----------------------------------------------------------------------

%%% add new func(f7) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7}

s15:=gspoly(f1, f5);

preduce(s15, {f1, f2, f3, f4, f5, f6, f7});

s16:=gspoly(f1, f6);

f8:=preduce(s16, {f1, f2, f3, f4, f5, f6, f7});

%-----------------------------------------------------------------------

%%% add new func(f8) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8}

s24:=gspoly(f2, f4);

preduce(s24, {f1, f2, f3, f4, f5, f6, f7, f8});

s25:=gspoly(f2, f5);

preduce(s25, {f1, f2, f3, f4, f5, f6, f7, f8});

s26:=gspoly(f2, f6);

preduce(s26, {f1, f2, f3, f4, f5, f6, f7, f8});

s34:=gspoly(f3, f4);

preduce(s34, {f1, f2, f3, f4, f5, f6, f7, f8});

s35:=gspoly(f3, f5);

preduce(s35, {f1, f2, f3, f4, f5, f6, f7, f8});

s36:=gspoly(f3, f6);

preduce(s36, {f1, f2, f3, f4, f5, f6, f7, f8});

s45:=gspoly(f4, f5);

f9:=preduce(s45, {f1, f2, f3, f4, f5, f6, f7, f8});

%-----------------------------------------------------------------------

%%% add new func(f9) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9}

s46:=gspoly(f4, f6);

preduce(s46, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

s56:=gspoly(f5, f6);

preduce(s56, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

%-----------------------------------------------------------------------

%% step (ii)-3 G={f1, f2, f3, f4, f5, f6, f7, f8, f9}

s17:=gspoly(f1, f7);

preduce(s17, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

s18:=gspoly(f1, f8);

f10:=preduce(s18, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

%-----------------------------------------------------------------------

%%% add new func(f10) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10}

s19:=gspoly(f1, f9);

preduce(s19, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

s27:=gspoly(f2, f7);

preduce(s27, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

s28:=gspoly(f2, f8);

preduce(s28, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

s29:=gspoly(f2, f9);

preduce(s29, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

s37:=gspoly(f3, f7);

preduce(s37, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

s38:=gspoly(f3, f8);

f11:=preduce(s38, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

%-----------------------------------------------------------------------

%%% add new func(f11) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11}

s39:=gspoly(f3, f9);

preduce(s39, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s47:=gspoly(f4, f7);

preduce(s47, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s48:=gspoly(f4, f8);

preduce(s48, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s49:=gspoly(f4, f9);

preduce(s49, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s57:=gspoly(f5, f7);

preduce(s57, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s58:=gspoly(f5, f8);

preduce(s58, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s59:=gspoly(f5, f9);

preduce(s59, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s67:=gspoly(f6, f7);

preduce(s67, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

s68:=gspoly(f6, f8);

f12:=preduce(s68, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

%-----------------------------------------------------------------------

%%% add new func(f12) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12}

s69:=gspoly(f6, f9);

preduce(s69, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s78:=gspoly(f7, f8);

preduce(s78, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s79:=gspoly(f7, f9);

preduce(s79, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s89:=gspoly(f8, f9);

preduce(s89, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

%-----------------------------------------------------------------------

%% step (ii)-4 G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12}

s110:=gspoly(f1, f10);

preduce(s110, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s111:=gspoly(f1, f11);

preduce(s111, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s112:=gspoly(f1, f12);

preduce(s112, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s210:=gspoly(f2, f10);

preduce(s210, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s211:=gspoly(f2, f11);

preduce(s211, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s212:=gspoly(f2, f12);

preduce(s212, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s310:=gspoly(f3, f10);

preduce(s310, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s311:=gspoly(f3, f11);

preduce(s311, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s312:=gspoly(f3, f12);

preduce(s312, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s410:=gspoly(f4, f10);

preduce(s410, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s411:=gspoly(f4, f11);

preduce(s411, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s412:=gspoly(f4, f12);

preduce(s412, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s510:=gspoly(f5, f10);

preduce(s510, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s511:=gspoly(f5, f11);

preduce(s511, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s512:=gspoly(f5, f12);

preduce(s512, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s610:=gspoly(f6, f10);

preduce(s610, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s611:=gspoly(f6, f11);

preduce(s611, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s612:=gspoly(f6, f12);

preduce(s612, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s710:=gspoly(f7, f10);

preduce(s710, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s711:=gspoly(f7, f11);

preduce(s711, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s712:=gspoly(f7, f12);

preduce(s712, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s810:=gspoly(f8, f10);

preduce(s810, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

s811:=gspoly(f8, f11);

f13:=preduce(s811, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

%-----------------------------------------------------------------------

%%% add new func(f13) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13}

s812:=gspoly(f8, f12);

preduce(s812, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

s910:=gspoly(f9, f10);

preduce(s910, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

s911:=gspoly(f9, f11);

f14:=preduce(s911, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

%-----------------------------------------------------------------------

%%% add new func(f14) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14}

s912:=gspoly(f9, f12);

preduce(s912, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1011:=gspoly(f10, f11);

preduce(s1011, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1012:=gspoly(f10, f12);

preduce(s1012, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1112:=gspoly(f11, f12);

preduce(s1112, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

%-----------------------------------------------------------------------

%% step (ii)-5 G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14}

s113:=gspoly(f1, f13);

preduce(s113, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s114:=gspoly(f1, f14);

preduce(s114, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s213:=gspoly(f2, f13);

preduce(s213, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s214:=gspoly(f2, f14);

preduce(s214, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s313:=gspoly(f3, f13);

preduce(s313, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s314:=gspoly(f3, f14);

preduce(s314, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s413:=gspoly(f4, f13);

preduce(s413, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s414:=gspoly(f4, f14);

preduce(s414, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s513:=gspoly(f5, f13);

preduce(s513, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s514:=gspoly(f5, f14);

preduce(s514, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s613:=gspoly(f6, f13);

preduce(s613, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s614:=gspoly(f6, f14);

preduce(s614, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s713:=gspoly(f7, f13);

preduce(s713, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s714:=gspoly(f7, f14);

preduce(s714, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s813:=gspoly(f8, f13);

preduce(s813, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s814:=gspoly(f8, f14);

preduce(s814, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s913:=gspoly(f9, f13);

preduce(s913, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s914:=gspoly(f9, f14);

preduce(s914, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1013:=gspoly(f10, f13);

preduce(s1013, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1014:=gspoly(f10, f14);

preduce(s1014, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1113:=gspoly(f11, f13);

preduce(s1113, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1114:=gspoly(f11, f14);

preduce(s1114, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1213:=gspoly(f12, f13);

preduce(s1213, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1214:=gspoly(f12, f14);

preduce(s1214, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

s1314:=gspoly(f13, f14);

preduce(s1314, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

% step (iii) terminates here.

%-----------------------------------------------------------------------

% mutual reduction

preduce(f1, {f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

preduce(f2, {f1, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

preduce(f3, {f1, f2, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

preduce(f4, {f1, f2, f3, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

preduce(f5, {f1, f2, f3, f4, f6, f7, f8, f9, f10, f11, f12, f13, f14});

preduce(f6, {f1, f2, f3, f4, f5, f7, f8, f9, f10, f11, f12, f13, f14});

preduce(f7, {f1, f2, f3, f4, f5, f6, f8, f9, f10, f11, f12, f13, f14});

preduce(f8, {f1, f2, f3, f4, f5, f6, f7, f9, f10, f11, f12, f13, f14});

preduce(f9, {f1, f2, f3, f4, f5, f6, f7, f8, f10, f11, f12, f13, f14});

preduce(f10, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f11, f12, f13, f14});

preduce(f11, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f12, f13, f14});

preduce(f12, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f13, f14});

preduce(f13, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f14});

preduce(f14, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

% the reduced Groebner Basis should be {f4, f12, f14}

%-----------------------------------------------------------------------

showtime;

;end;

◇ 出力ファイル

%-----------------------------------------------------------------------

% Groebner Bassis Computation (in detail + loop count mutual reduction)

%-----------------------------------------------------------------------

load\_package groebner$

torder({x, y, z}, lex)$

f1:=x^2+y\*z-2;

2

f1 := x + y\*z - 2

f2:=y^2+x\*z-3;

2

f2 := x\*z + y - 3

f3:=x\*y+z^2-5;

2

f3 := x\*y + z - 5

%-----------------------------------------------------------------------

%% step (ii)-1 G={f1, f2, f3}

s12:=gspoly(f1, f2);

2 2

s12 := x\*y - 3\*x - y\*z + 2\*z

f4:=preduce(s12, {f1, f2, f3});

2

f4 := - 3\*x - 2\*y\*z + 5\*y + 2\*z

%-----------------------------------------------------------------------

%%% add new func(f4) to G\_group

%%% G={f1, f2, f3, f4}

s13:=gspoly(f1, f3);

2 2

s13 := x\*z - 5\*x - y \*z + 2\*y

f5:=preduce(s13, {f1, f2, f3, f4});

2 10 2 19 1

f5 := - 2\*y \*z + ----\*y\*z - ----\*y - ---\*z

3 3 3

%-----------------------------------------------------------------------

%%% add new func(f5) to G\_group

%%% G={f1, f2, f3, f4, f5}

s23:=gspoly(f2, f3);

3 3

s23 := - y + 3\*y + z - 5\*z

f6:=preduce(s23, {f1, f2, f3, f4, f5});

3 3

f6 := - y + 3\*y + z - 5\*z

%-----------------------------------------------------------------------

%%% add new func(f6) to G\_group

%%% G={f1, f2, f3, f4, f5, f6}

%-----------------------------------------------------------------------

%% step (ii)-2 G={f1, f2, f3, f4, f5, f6}

s14:=gspoly(f1, f4);

2

s14 := - 2\*x\*y\*z + 5\*x\*y + 2\*x\*z + 3\*y\*z - 6

f7:=preduce(s14, {f1, f2, f3, f4, f5, f6});

25 2 50 3 125 50 2

f7 := - ----\*y + ----\*y\*z - -----\*y\*z - ----\*z + 25

3 9 9 9

%-----------------------------------------------------------------------

%%% add new func(f7) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7}

s15:=gspoly(f1, f5);

2 2 2 2 3 2 2

s15 := 10\*x \*y\*z - 19\*x \*y - x \*z + 6\*y \*z - 12\*y \*z

preduce(s15, {f1, f2, f3, f4, f5, f6, f7});

0

s16:=gspoly(f1, f6);

2 2 3 2 4 3

s16 := 3\*x \*y + x \*z - 5\*x \*z + y \*z - 2\*y

f8:=preduce(s16, {f1, f2, f3, f4, f5, f6, f7});

98 4 490 2 931 98 3 931

f8 := ----\*y\*z - -----\*y\*z + -----\*y - ----\*z + -----\*z

27 27 54 27 54

%-----------------------------------------------------------------------

%%% add new func(f8) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8}

s24:=gspoly(f2, f4);

2 3 2

s24 := 3\*y - 2\*y\*z + 5\*y\*z + 2\*z - 9

preduce(s24, {f1, f2, f3, f4, f5, f6, f7, f8});

0

s25:=gspoly(f2, f5);

2 4 2

s25 := 10\*x\*y\*z - 19\*x\*y - x\*z + 6\*y - 18\*y

preduce(s25, {f1, f2, f3, f4, f5, f6, f7, f8});

0

s26:=gspoly(f2, f6);

4 2 5 3

s26 := 3\*x\*y\*z + x\*z - 5\*x\*z + y - 3\*y

preduce(s26, {f1, f2, f3, f4, f5, f6, f7, f8});

0

s34:=gspoly(f3, f4);

2 2 2 2

s34 := - 2\*y \*z + 5\*y + 2\*y\*z + 3\*z - 15

preduce(s34, {f1, f2, f3, f4, f5, f6, f7, f8});

0

s35:=gspoly(f3, f5);

2 3

s35 := 10\*x\*y\*z - 19\*x\*y - x\*z + 6\*y\*z - 30\*y\*z

preduce(s35, {f1, f2, f3, f4, f5, f6, f7, f8});

0

s36:=gspoly(f3, f6);

3 2 2 2

s36 := 3\*x\*y + x\*z - 5\*x\*z + y \*z - 5\*y

preduce(s36, {f1, f2, f3, f4, f5, f6, f7, f8});

0

s45:=gspoly(f4, f5);

2 3 3 3 2 2

s45 := - 10\*x\*y\*z + 19\*x\*y + x\*z - 4\*y \*z + 10\*y \*z + 4\*y \*z

f9:=preduce(s45, {f1, f2, f3, f4, f5, f6, f7, f8});

20 3 95 4 205 2

f9 := ----\*y\*z - ----\*y\*z - 10\*z + -----\*z - 95

3 3 3

%-----------------------------------------------------------------------

%%% add new func(f9) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9}

s46:=gspoly(f4, f6);

3 4 2 4 3

s46 := - 9\*x\*y - 3\*x\*z + 15\*x\*z - 2\*y \*z + 5\*y + 2\*y \*z

preduce(s46, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

0

s56:=gspoly(f5, f6);

2 2 2 4 2

s56 := 10\*y \*z - 19\*y - 19\*y\*z - 6\*z + 30\*z

preduce(s56, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

0

%-----------------------------------------------------------------------

%% step (ii)-3 G={f1, f2, f3, f4, f5, f6, f7, f8, f9}

s17:=gspoly(f1, f7);

2 3 2 2 2 2 3 2

s17 := 50\*x \*y\*z - 125\*x \*y\*z - 50\*x \*z + 225\*x + 75\*y \*z - 150\*y

preduce(s17, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

0

s18:=gspoly(f1, f8);

2 2 2 2 3 2 2 5 4

s18 := - 980\*x \*y\*z + 931\*x \*y - 196\*x \*z + 931\*x \*z - 196\*y \*z + 392\*y\*z

f10:=preduce(s18, {f1, f2, f3, f4, f5, f6, f7, f8, f9});

2 5 3

f10 := 49\*y\*z - 931\*y - 294\*z + 2205\*z - 3724\*z

%-----------------------------------------------------------------------

%%% add new func(f10) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10}

s19:=gspoly(f1, f9);

2 2 4 2 2 2 2 4 3

s19 := - 95\*x \*y\*z - 30\*x \*z + 205\*x \*z - 285\*x - 20\*y \*z + 40\*y\*z

preduce(s19, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

0

s27:=gspoly(f2, f7);

4 2 3 4 2

s27 := 50\*x\*y\*z - 125\*x\*y\*z - 50\*x\*z + 225\*x\*z + 75\*y - 225\*y

preduce(s27, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

0

s28:=gspoly(f2, f8);

2 3 3 3 3

s28 := - 980\*x\*y\*z + 931\*x\*y - 196\*x\*z + 931\*x\*z - 196\*y \*z + 588\*y\*z

preduce(s28, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

0

s29:=gspoly(f2, f9);

4 2 3 2 2

s29 := - 95\*x\*y\*z - 30\*x\*z + 205\*x\*z - 285\*x - 20\*y \*z + 60\*y\*z

preduce(s29, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

0

s37:=gspoly(f3, f7);

3 2 2

s37 := 50\*x\*y\*z - 125\*x\*y\*z - 50\*x\*z + 225\*x + 75\*y\*z - 375\*y

preduce(s37, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

0

s38:=gspoly(f3, f8);

2 3 6 4

s38 := - 980\*x\*y\*z + 931\*x\*y - 196\*x\*z + 931\*x\*z - 196\*z + 980\*z

f11:=preduce(s38, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10});

931 6 4 5635 2 931

f11 := - -----\*y\*z - 196\*z + 1519\*z - ------\*z + -----

2 2 2

%-----------------------------------------------------------------------

%%% add new func(f11) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11}

s39:=gspoly(f3, f9);

4 2 5 3

s39 := - 95\*x\*y\*z - 30\*x\*z + 205\*x\*z - 285\*x - 20\*z + 100\*z

preduce(s39, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s47:=gspoly(f4, f7);

3 2 3 2 3 2

s47 := - 50\*x\*y\*z + 125\*x\*y\*z + 50\*x\*z - 225\*x - 50\*y \*z + 125\*y + 50\*y \*z

preduce(s47, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s48:=gspoly(f4, f8);

s48 :=

2 3 2 6 2 4 5

2940\*x\*y\*z - 2793\*x\*y + 588\*x\*z - 2793\*x\*z + 392\*y \*z - 980\*y \*z - 392\*y\*z

preduce(s48, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s49:=gspoly(f4, f9);

4 2 2 5 2 3 4

s49 := 285\*x\*y\*z + 90\*x\*z - 615\*x\*z + 855\*x + 40\*y \*z - 100\*y \*z - 40\*y\*z

preduce(s49, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s57:=gspoly(f5, f7);

4 2 3

s57 := - 100\*y\*z + 500\*y\*z - 475\*y + 100\*z - 475\*z

preduce(s57, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s58:=gspoly(f5, f8);

2 2 2 5 3 4

s58 := 2940\*y \*z - 2793\*y - 980\*y\*z + 2450\*y\*z - 2793\*y\*z + 98\*z

preduce(s58, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s59:=gspoly(f5, f9);

2 4 2 3

s59 := 285\*y \*z - 10\*y\*z - 425\*y\*z + 855\*y + 10\*z

preduce(s59, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s67:=gspoly(f6, f7);

2 3 2 2 3

s67 := - 50\*y \*z + 125\*y \*z + 50\*y\*z + 75\*z - 375\*z

preduce(s67, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

0

s68:=gspoly(f6, f8);

3 2 3 2 3 2 4 7 5

s68 := 980\*y \*z - 931\*y + 196\*y \*z - 931\*y \*z - 588\*y\*z - 196\*z + 980\*z

f12:=preduce(s68, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11});

17689 7 5 3 69825

f12 := - -------\*y - 196\*z - 1274\*z + 18130\*z - -------\*z

2 2

%-----------------------------------------------------------------------

%%% add new func(f12) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12}

s69:=gspoly(f6, f9);

3 2 4 2 2 2 3 6 4

s69 := 95\*y \*z + 30\*y \*z - 205\*y \*z + 285\*y - 60\*y\*z - 20\*z + 100\*z

preduce(s69, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s78:=gspoly(f7, f8);

2 2 2 7 5 3

s78 := 73500\*y \*z - 69825\*y - 9800\*y\*z + 24500\*y\*z + 14700\*y\*z - 69825\*y\*z

6 4

+ 9800\*z - 44100\*z

preduce(s78, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s79:=gspoly(f7, f9);

2 6 4 2 5 3

s79 := 1425\*y \*z - 200\*y\*z + 950\*y\*z - 3075\*y\*z + 4275\*y + 200\*z - 900\*z

preduce(s79, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s89:=gspoly(f8, f9);

2 5 3

s89 := 245\*y\*z - 4655\*y - 1470\*z + 11025\*z - 18620\*z

preduce(s89, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

%-----------------------------------------------------------------------

%% step (ii)-4 G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12}

s110:=gspoly(f1, f10);

2 2 5 2 3 2 2 3 2

s110 := - 931\*x \*y - 294\*x \*z + 2205\*x \*z - 3724\*x \*z - 49\*y \*z + 98\*y\*z

preduce(s110, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s111:=gspoly(f1, f11);

2 6 2 4 2 2 2 2 2

s111 := - 392\*x \*z + 3038\*x \*z - 5635\*x \*z + 931\*x + 931\*y \*z - 1862\*y\*z

preduce(s111, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s112:=gspoly(f1, f12);

s112 :=

2 7 2 5 2 3 2 2

- 392\*x \*z - 2548\*x \*z + 36260\*x \*z - 69825\*x \*z + 17689\*y \*z - 35378\*y

preduce(s112, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s210:=gspoly(f2, f10);

5 3 3

s210 := - 931\*x\*y - 294\*x\*z + 2205\*x\*z - 3724\*x\*z - 49\*y \*z + 147\*y\*z

preduce(s210, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s211:=gspoly(f2, f11);

6 4 2 3

s211 := - 392\*x\*z + 3038\*x\*z - 5635\*x\*z + 931\*x + 931\*y - 2793\*y

preduce(s211, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s212:=gspoly(f2, f12);

8 6 4 2 3

s212 := - 392\*x\*z - 2548\*x\*z + 36260\*x\*z - 69825\*x\*z + 17689\*y - 53067\*y

preduce(s212, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s310:=gspoly(f3, f10);

5 3 4 2

s310 := - 931\*x\*y - 294\*x\*z + 2205\*x\*z - 3724\*x\*z - 49\*z + 245\*z

preduce(s310, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s311:=gspoly(f3, f11);

6 4 2 3

s311 := - 392\*x\*z + 3038\*x\*z - 5635\*x\*z + 931\*x + 931\*z - 4655\*z

preduce(s311, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s312:=gspoly(f3, f12);

7 5 3 2

s312 := - 392\*x\*z - 2548\*x\*z + 36260\*x\*z - 69825\*x\*z + 17689\*z - 88445

preduce(s312, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s410:=gspoly(f4, f10);

s410 :=

5 3 2 4 2 2 3

2793\*x\*y + 882\*x\*z - 6615\*x\*z + 11172\*x\*z + 98\*y \*z - 245\*y \*z - 98\*y\*z

preduce(s410, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s411:=gspoly(f4, f11);

s411 :=

6 4 2 2 3 2 2

1176\*x\*z - 9114\*x\*z + 16905\*x\*z - 2793\*x - 1862\*y \*z + 4655\*y \*z + 1862\*y\*z

preduce(s411, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s412:=gspoly(f4, f12);

7 5 3 2 2

s412 := 1176\*x\*z + 7644\*x\*z - 108780\*x\*z + 209475\*x\*z - 35378\*y \*z

2

+ 88445\*y + 35378\*y\*z

preduce(s412, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s510:=gspoly(f5, f10);

2 5 3 2

s510 := 5586\*y + 1764\*y\*z - 13720\*y\*z + 23275\*y\*z + 49\*z

preduce(s510, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s511:=gspoly(f5, f11);

6 4 2

s511 := 2352\*y\*z - 18228\*y\*z + 43120\*y\*z - 23275\*y - 931\*z

preduce(s511, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s512:=gspoly(f5, f12);

8 6 4 2

s512 := 2352\*y\*z + 15288\*y\*z - 217560\*y\*z + 595840\*y\*z - 336091\*y - 17689\*z

preduce(s512, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s610:=gspoly(f6, f10);

3 2 5 2 3 2 2 5 3

s610 := 931\*y + 294\*y \*z - 2205\*y \*z + 3724\*y \*z - 147\*y\*z - 49\*z + 245\*z

preduce(s610, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s611:=gspoly(f6, f11);

s611 :=

2 6 2 4 2 2 2 4 2

392\*y \*z - 3038\*y \*z + 5635\*y \*z - 931\*y + 2793\*y\*z + 931\*z - 4655\*z

preduce(s611, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s612:=gspoly(f6, f12);

s612 :=

2 7 2 5 2 3 2 3

392\*y \*z + 2548\*y \*z - 36260\*y \*z + 69825\*y \*z + 53067\*y + 17689\*z - 88445\*z

preduce(s612, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s710:=gspoly(f7, f10);

2 5 3 4 2

s710 := 69825\*y + 19600\*y\*z - 159250\*y\*z + 279300\*y\*z + 2450\*z - 11025\*z

preduce(s710, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s711:=gspoly(f7, f11);

6 4 2 3

s711 := 29400\*y\*z - 181300\*y\*z + 306250\*y\*z - 69825\*y - 46550\*z + 209475\*z

preduce(s711, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s712:=gspoly(f7, f12);

s712 :=

7 5 3 2

29400\*y\*z + 191100\*y\*z - 1835050\*y\*z + 3025750\*y\*z - 884450\*z + 3980025

preduce(s712, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s810:=gspoly(f8, f10);

2 7 5 3

s810 := - 2744\*y\*z - 931\*y - 1176\*z + 8820\*z - 14700\*z - 931\*z

preduce(s810, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

0

s811:=gspoly(f8, f11);

2 9 7 5

s811 := - 18620\*y\*z + 17689\*y - 1568\*z + 12152\*z - 22540\*z + 17689\*z

f13:=preduce(s811, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12});

9 7 5 3

f13 := - 1568\*z + 19600\*z - 85848\*z + 148960\*z - 70756\*z

%-----------------------------------------------------------------------

%%% add new func(f13) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13}

s812:=gspoly(f8, f12);

2 11 9 7 5

s812 := - 353780\*y\*z + 336091\*y - 1568\*z - 10192\*z + 145040\*z - 279300\*z

3

- 70756\*z + 336091\*z

preduce(s812, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

0

s910:=gspoly(f9, f10);

6 4 2

s910 := - 13965\*y\*z - 5880\*z + 45570\*z - 84525\*z + 13965

preduce(s910, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

0

s911:=gspoly(f9, f11);

8 6 4 2

s911 := - 88445\*y\*z - 7840\*z + 60760\*z - 140630\*z + 209475\*z - 265335

f14:=preduce(s911, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

8 6 4 2

f14 := - 7840\*z + 98000\*z - 429240\*z + 744800\*z - 353780

%-----------------------------------------------------------------------

%%% add new func(f14) to G\_group

%%% G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14}

s912:=gspoly(f9, f12);

10 8 6 4

s912 := - 1680455\*y\*z - 7840\*z - 50960\*z + 725200\*z - 1927170\*z

2

+ 3626245\*z - 5041365

preduce(s912, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1011:=gspoly(f10, f11);

7 5 3

s1011 := - 17689\*y - 392\*z - 2548\*z + 36260\*z - 69825\*z

preduce(s1011, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1012:=gspoly(f10, f12);

9 7 5 3

s1012 := - 336091\*y - 392\*z - 2548\*z - 69874\*z + 726180\*z - 1344364\*z

preduce(s1012, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1112:=gspoly(f11, f12);

8 6 4 2

s1112 := 392\*z - 4900\*z + 21462\*z - 37240\*z + 17689

preduce(s1112, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

%-----------------------------------------------------------------------

%% step (ii)-5 G={f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14}

s113:=gspoly(f1, f13);

s113 :=

2 7 2 5 2 3 2 10 9

19600\*x \*z - 85848\*x \*z + 148960\*x \*z - 70756\*x \*z + 1568\*y\*z - 3136\*z

preduce(s113, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s114:=gspoly(f1, f14);

s114 :=

2 6 2 4 2 2 2 9 8

98000\*x \*z - 429240\*x \*z + 744800\*x \*z - 353780\*x + 7840\*y\*z - 15680\*z

preduce(s114, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s213:=gspoly(f2, f13);

7 5 3 2 8 8

s213 := 19600\*x\*z - 85848\*x\*z + 148960\*x\*z - 70756\*x\*z + 1568\*y \*z - 4704\*z

preduce(s213, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s214:=gspoly(f2, f14);

s214 :=

6 4 2 2 7 7

98000\*x\*z - 429240\*x\*z + 744800\*x\*z - 353780\*x + 7840\*y \*z - 23520\*z

preduce(s214, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s313:=gspoly(f3, f13);

s313 :=

7 5 3 11 9

19600\*x\*y\*z - 85848\*x\*y\*z + 148960\*x\*y\*z - 70756\*x\*y\*z + 1568\*z - 7840\*z

preduce(s313, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s314:=gspoly(f3, f14);

s314 :=

6 4 2 10 8

98000\*x\*y\*z - 429240\*x\*y\*z + 744800\*x\*y\*z - 353780\*x\*y + 7840\*z - 39200\*z

preduce(s314, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s413:=gspoly(f4, f13);

7 5 3 11

s413 := - 58800\*x\*z + 257544\*x\*z - 446880\*x\*z + 212268\*x\*z - 3136\*y\*z

9 10

+ 7840\*y\*z + 3136\*z

preduce(s413, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s414:=gspoly(f4, f14);

6 4 2 10

s414 := - 294000\*x\*z + 1287720\*x\*z - 2234400\*x\*z + 1061340\*x - 15680\*y\*z

8 9

+ 39200\*y\*z + 15680\*z

preduce(s414, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s513:=gspoly(f5, f13);

2 7 2 5 2 3 2 10

s513 := - 58800\*y \*z + 257544\*y \*z - 446880\*y \*z + 212268\*y \*z + 7840\*y\*z

8 9

- 14896\*y\*z - 784\*z

preduce(s513, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s514:=gspoly(f5, f14);

2 6 2 4 2 2 2

s514 := - 294000\*y \*z + 1287720\*y \*z - 2234400\*y \*z + 1061340\*y

9 7 8

+ 39200\*y\*z - 74480\*y\*z - 3920\*z

preduce(s514, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s613:=gspoly(f6, f13);

3 7 3 5 3 3 3 9

s613 := - 19600\*y \*z + 85848\*y \*z - 148960\*y \*z + 70756\*y \*z + 4704\*y\*z

12 10

+ 1568\*z - 7840\*z

preduce(s613, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s614:=gspoly(f6, f14);

3 6 3 4 3 2 3 8

s614 := - 98000\*y \*z + 429240\*y \*z - 744800\*y \*z + 353780\*y + 23520\*y\*z

11 9

+ 7840\*z - 39200\*z

preduce(s614, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s713:=gspoly(f7, f13);

2 7 2 5 2 3 2

s713 := - 1470000\*y \*z + 6438600\*y \*z - 11172000\*y \*z + 5306700\*y \*z

12 10 11 9

+ 78400\*y\*z - 196000\*y\*z - 78400\*z + 352800\*z

preduce(s713, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s714:=gspoly(f7, f14);

2 6 2 4 2 2 2

s714 := - 1470000\*y \*z + 6438600\*y \*z - 11172000\*y \*z + 5306700\*y

11 9 10 8

+ 78400\*y\*z - 196000\*y\*z - 78400\*z + 352800\*z

preduce(s714, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s813:=gspoly(f8, f13);

7 5 3 8 6

s813 := 11760\*y\*z - 78400\*y\*z + 148960\*y\*z - 70756\*y\*z - 1568\*z + 7448\*z

preduce(s813, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s814:=gspoly(f8, f14);

6 4 2 7 5

s814 := 58800\*y\*z - 392000\*y\*z + 744800\*y\*z - 353780\*y - 7840\*z + 37240\*z

preduce(s814, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s913:=gspoly(f9, f13);

7 5 3 10

s913 := 60760\*y\*z - 429240\*y\*z + 744800\*y\*z - 353780\*y\*z - 11760\*z

8 6

+ 80360\*z - 111720\*z

preduce(s913, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s914:=gspoly(f9, f14);

6 4 2 9 7

s914 := 60760\*y\*z - 429240\*y\*z + 744800\*y\*z - 353780\*y - 11760\*z + 80360\*z

5

- 111720\*z

preduce(s914, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1013:=gspoly(f10, f13);

7 5 3 12

s1013 := - 10192\*y\*z - 85848\*y\*z + 148960\*y\*z - 70756\*y\*z - 9408\*z

10 8

+ 70560\*z - 119168\*z

preduce(s1013, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1014:=gspoly(f10, f14);

6 4 2 11

s1014 := - 50960\*y\*z - 429240\*y\*z + 744800\*y\*z - 353780\*y - 47040\*z

9 7

+ 352800\*z - 595840\*z

preduce(s1014, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1113:=gspoly(f11, f13);

7 5 3 14

s1113 := - 372400\*y\*z + 1631112\*y\*z - 2830240\*y\*z + 1344364\*y\*z - 12544\*z

12 10 8

+ 97216\*z - 180320\*z + 29792\*z

preduce(s1113, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1114:=gspoly(f11, f14);

6 4 2 13

s1114 := - 1862000\*y\*z + 8155560\*y\*z - 14151200\*y\*z + 6721820\*y - 62720\*z

11 9 7

+ 486080\*z - 901600\*z + 148960\*z

preduce(s1114, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1213:=gspoly(f12, f13);

7 5 3

s1213 := - 7075600\*y\*z + 30991128\*y\*z - 53774560\*y\*z + 25542916\*y\*z

16 14 12 10

- 12544\*z - 81536\*z + 1160320\*z - 2234400\*z

preduce(s1213, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1214:=gspoly(f12, f14);

6 4 2

s1214 := - 35378000\*y\*z + 154955640\*y\*z - 268872800\*y\*z + 127714580\*y

15 13 11 9

- 62720\*z - 407680\*z + 5801600\*z - 11172000\*z

preduce(s1214, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

s1314:=gspoly(f13, f14);

s1314 := 0

preduce(s1314, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

% step (iii) terminates here.

%-----------------------------------------------------------------------

% mutual reduction

preduce(f1, {f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

preduce(f2, {f1, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

preduce(f3, {f1, f2, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

preduce(f4, {f1, f2, f3, f5, f6, f7, f8, f9, f10, f11, f12, f13, f14});

264 7 2616 5 8070 3 375

- 3\*x + -----\*z - ------\*z + ------\*z - -----\*z

361 361 361 19

preduce(f5, {f1, f2, f3, f4, f6, f7, f8, f9, f10, f11, f12, f13, f14});

0

preduce(f6, {f1, f2, f3, f4, f5, f7, f8, f9, f10, f11, f12, f13, f14});

0

preduce(f7, {f1, f2, f3, f4, f5, f6, f8, f9, f10, f11, f12, f13, f14});

0

preduce(f8, {f1, f2, f3, f4, f5, f6, f7, f9, f10, f11, f12, f13, f14});

0

preduce(f9, {f1, f2, f3, f4, f5, f6, f7, f8, f10, f11, f12, f13, f14});

0

preduce(f10, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f11, f12, f13, f14});

0

preduce(f11, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f12, f13, f14});

0

preduce(f12, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f13, f14});

17689 7 5 3 69825

- -------\*y - 196\*z - 1274\*z + 18130\*z - -------\*z

2 2

preduce(f13, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f14});

0

preduce(f14, {f1, f2, f3, f4, f5, f6, f7, f8, f9, f10, f11, f12, f13});

8 6 4 2

- 7840\*z + 98000\*z - 429240\*z + 744800\*z - 353780

% the reduced Groebner Basis should be {hoge, foo, bar}

%-----------------------------------------------------------------------

showtime;

Time: 40 ms

;

end;