1 rt;maple_mode(0);cas_setup(0,0,0,1,0,1e-10,10,[1,50,0,25],0,0,0); #radians,pas de cmplx, pas de Sqrt

Syntax compatibility mode xcas
Parse error line 1 at pas

[∏ , Warning: some commands like subs might change arguments order , 0, 0, 0, 1, 0, 0.1000000000

2 ----------Exercice----------

3 l:=5^(1/3)+sqrt(5);

$$5^{\frac{1}{3}} + \sqrt{5}$$

4 P:=resultant((x-y)^3-5,y^2-5,y);

$$x^6 - 15 \cdot x^4 - 10 \cdot x^3 + 75 \cdot x^2 - 150 \cdot x - 100$$

5 if(simplify(unapply(P,x)(l))==0) then print("c'est bon") fi;

c'est bon

$$1$$

6

7 Prog Edit Add | 1 | nxt | | OK (F9) | Save

```
pmsomme:=proc(A,B)
local fA,fB;
fA:=unapply(A,x)(x-y);
fB:=unapply(B,x)(y);
resultant(fA,fB,y)
end;
```

// End defining pmsomme

(A,B)->
{ local fA,fB;

8 l:=5^(1/3)+sqrt(2)+5^(1/7)+1+2^(1/5)

$$5^{\frac{1}{3}} + \sqrt{2} + 5^{\frac{1}{7}} + 1 + 2^{\frac{1}{5}}$$

9 P1:=pmsomme(x^3-5,x^2-2);

$$x^6 - 6 \cdot x^4 - 10 \cdot x^3 + 12 \cdot x^2 - 60 \cdot x + 17$$

10 P2:=pmsomme(P1,x^7-5);

$$x^{42} - 42 \cdot x^{40} - 70 \cdot x^{39} + 840 \cdot x^{38} + 2100 \cdot x^{37} - 8365 \cdot x^{36} - 27750 \cdot x^{35} + 51660 \cdot x^{34} + 154000 \cdot x^{33} - 352968$$
$$-1925490 \cdot x^{29} - 11211615 \cdot x^{28} - 11321170 \cdot x^{27} + 45424890 \cdot x^{26} - 592401390 \cdot x^{25} + 116581115 \cdot x^{24} +$$
$$-25383954480 \cdot x^{21} - 31019862468 \cdot x^{20} + 91854417900 \cdot x^{19} + 457122006705 \cdot x^{18} - 421760853570 \cdot$$
$$-986702247790 \cdot x^{15} + 4184223793245 \cdot x^{14} + 4658701493670 \cdot x^{13} - 7244840035027 \cdot x^{12} - 8872696218$$
$$3605890025220 \cdot x^{9} + 25214604415455 \cdot x^{8} - 10015389847980 \cdot x^{7} - 20486058629855 \cdot x^{6} - 43790480063$$
$$44996167205780 \cdot x^{3} + 29341849614021 \cdot x^{2} - 25398995624100 \cdot x + 8446858571698$$

11 P3:=pmsomme(P2,(x-1)^5-2);

Evaluation time: 1.34

$$x^{210} -210 \cdot x^{209} + 21735 \cdot x^{208} -1478190 \cdot x^{207} + 74312070 \cdot x^{206} -2945491206 \cdot x^{205} + 95883507125$$
$$62523744001320 \cdot x^{202} -1298934302265600 \cdot x^{201} + 23939293006675767 \cdot x^{200} -3954014079446770$$
$$5902669181195240125 \cdot x^{198} -80217335401558260150 \cdot x^{197} + 998621740075672141575 \cdot x^{196} -1$$
$$1215226447003749638167 50 \cdot x^{194} -11990118026425140743641 50 \cdot x^{193} + 110429450869297680507$$
$$-952967454129458541970528 50 \cdot x^{191} + 773281630210152111065563455 \cdot x^{190} -591990624889550$$
$$4289327680308002338830829 3725 \cdot x^{188} -2950373125747154243478855460 50 \cdot x^{187} + 193211900$$
$$-1207969498138727341993024677881 4 \cdot x^{185} + 722898244288806454624564956144 90 \cdot x^{184}$$
$$-4151127330478258520223509639821 90 \cdot x^{183} + 229256852441271024236016645283521 0 \cdot x^{182}$$
$$-1220321162043152328992292799121118 0 \cdot x^{181} + 627302645575063169713280676352282 74 \cdot x$$
$$-3119719106529336696015782073644967 00 \cdot x^{179} + 150350775106863466053800234426616249 0$$
$$-7032374875328838673319485620687396680 \cdot x^{177} + 319671839502666478471263338353492735 50$$
$$-1414056063426480700249786057672947076 38 \cdot x^{175} + 609403254745607820243237619411188833 77$$
$$-2561550521496188382167906258364597553800 \cdot x^{173} + 105127078261892146612504950225783302 4$$
$$-4216539809307315928754937584243812015750 0 \cdot x^{171} + 165420718032327989131694889306057121$$
$$-6351746829103996073627594368253495998059 00 \cdot x^{169} + 238789168368513105996881887994299 94$$
$$-8788548076550049942655362749330623688168100 \cdot x^{167} + 316454675733417851419015270748592$$
$$-1113223077858110867962502900878002461440340 00 \cdot x^{165} + 381680951969742315357337252105 3$$
$$-1270883723853811274540869256613085385910816000 \cdot x^{163} + 408794367314207407057006342001$$
$$-1260293181519513340053430527842768366544519360 0 \cdot x^{161} + 367752724756208148994529051 12$$
$$-9932275530556329185174389234802380171927282409 0 \cdot x^{159} + 236693958556646185811833918 54$$
$$-4317355214290919374061696969779967132840343126 60 \cdot x^{157} + 163705193822776583056462387 6$$
$$3774532909867359510763142605091499258607503236796 \cdot x^{155} -2649807893842952406137050681$$
$$1308763518893482658439463819198334112042799697902 10 \cdot x^{153}$$
$$-5586491778802782152536942087471388475346877150626 95 \cdot x^{152} +$$
$$2185669229094599063062851743089564849014598443607500 \cdot x^{151}$$
$$-8023107754537014542550474121298003289092082487360737 \cdot x^{150} +$$
$$2788751538069629702249373702577364736462678155211555 0 \cdot x^{149}$$
$$-9188063211895626608128570110207166112258032347076072 5 \cdot x^{148} +$$
$$2851896895736080878973545143281989679540382767681867 00 \cdot x^{147}$$
$$-8208983378555079505924407344142462128617446858193207 50 \cdot x^{146} +$$
$$2114688858984469182560439905103109666966332767196286560 \cdot x^{145}$$
$$-4428819348833809442902725225939580367165388745391161050 \cdot x^{144} +$$

M

12 size(factors(P3));

Evaluation time: 0.89

2

M

13 simplify(unapply(P3,x)(l)); // ca doit etre nul

Evaluation time: 4.84

0

M

14 ----------Exercice----------

15 P:=x^4+x+1;

$$x^4 + x + 1$$

M

16 A:=1/d*add(a[j]*x^j,j=0..degree(P)-1);

$$1 \cdot \left(\frac{1}{d}\right) \cdot (a[0] + (a[1]) \cdot x + (a[2]) \cdot x^2 + (a[3]) \cdot x^3)$$

M

17 H:=d*A;

$$d \cdot 1 \cdot \left(\frac{1}{}\right) \cdot (a[0] + (a[1]) \cdot x + (a[2]) \cdot x^2 + (a[3]) \cdot x^3)$$

18 M:=matrix([seq([seq(coeff(rem(A*x^ii,P,x),x,j),ii=0..degree(P)-1)],j=0..degree(P)-1)]);

$$\begin{bmatrix} \frac{a[0]}{d}, & \frac{-(a[3])}{d}, & \frac{-(a[2])}{d}, & \frac{-(a[1])}{d} \\ \frac{a[1]}{d}, & \frac{a[0]-(a[3])}{d}, & \frac{-(a[3])-(a[2])}{d}, & \frac{-(a[2])-(a[1])}{d} \\ \frac{a[2]}{d}, & \frac{a[1]}{d}, & \frac{a[0]-(a[3])}{d}, & \frac{-(a[3])-(a[2])}{d} \\ \frac{a[3]}{d}, & \frac{a[2]}{d}, & \frac{a[1]}{d}, & \frac{a[0]-(a[3])}{d} \end{bmatrix}$$

M

19 M:=matrix(4,4,(ii,j)->coeff(rem(A*x^(j-1),P),x,ii-1)); //c'est plus simple

// Warning: A,x,P, declared as global variable(s)

Bad Argument Value

M

20 cp:=charpoly(M,x):;

Done

M

21 res:=resultant(subst(P,x=y),d*x-subst(H,x=y),y):; //attention re est un mot reserve

Done

M

22 le poly caract est 1/d^(deg P) * resultant: verification:

23 normal(d^(degree(P))*cp-res); //ils sont bien egaux

0

M

24 P:=x^4+1;

$$x^4 + 1$$

M

25 A:=x^2:;H:=A;

$$(\text{Done}, x^2)$$

M

26 M:=matrix([seq([seq(coeff(rem(A*x^ii,P,x),x,j),ii=0..degree(P)-1)],j=0..degree(P)-1)]);

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

M

27 cp:=charpoly(M,x):;

Done

M

28 res:=resultant(unapply(P,x)(y),x-unapply(H,x)(y),y):;

Done

M

29 le poly caract est 1/d^(deg P) * resultant: verification:

30 normal(cp-res);

0

M

31 le poly min est une puissance de:

32 gcd(res,diff(res,x));

$$x^2 + 1$$

M

33 pmin(M,x);//ils sont egaux.

$$x^2 + 1$$

M

34 ----------

Exercice: Contour apparent

35 B:=(x-1)^2+(y-2)^2+(z-4)^2-4

$$(x-1)^2 + (y-2)^2 + (z-4)^2 - 4$$

M

36 M:=[x,y,0]+t*[1,0,2]

37 P1:=unapply(B,x,y,z)(op(M));

$$(x+t-1)^2+(y-2)^2+(2\cdot t-4)^2-4$$

38 P2:=diff(P1,t);

$$2\cdot(x+t-1)+4\cdot(2\cdot t-4)$$

39 EQ:=resultant(P1,P2,t)

$$80\cdot x^2+160\cdot x+100\cdot y^2-400\cdot y+80$$

40 D1:=implicitplot(B,[x=-5..5,y=-5..5,z=0..8],display=magenta+rempli):;

Ellipsoid of center Vector [1.0,2.0,4.0]

Done

41 D3:=plan(z=0,couleur=yellow):;

Done

42 CYL:=unapply(EQ,x)(x-z/2) // l'equation du cylindre

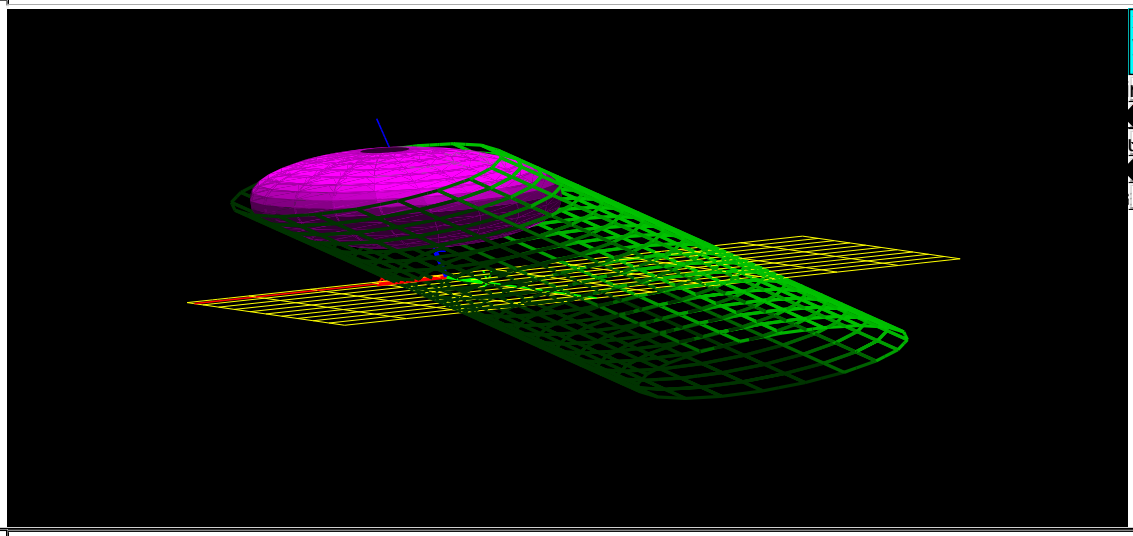
$$80\cdot\left(x-\left(\frac{z}{2}\right)\right)^2+160\cdot\left(x-\left(\frac{z}{2}\right)\right)+100\cdot y^2-400\cdot y+80$$

43 D2:=implicitplot(CYL,[x=-5..5,y=-5..5,z=0..10],display=green+line_width_3):;

Elliptic cylinder around Vector [-0.7999999999999,2.0,0.4]

Done

44 D3,D1,D2;



45 ----------