

```
> p1:=-3*x+7*x^2-3*x^3+7*x^4;p2:=5*x^5+3*x^3+x^2-2*x+1;
```

$$p1 := -3x + 7x^2 - 3x^3 + 7x^4$$

$$p2 := 5x^5 + 3x^3 + x^2 - 2x + 1$$

```
> sort(expand(p1*p2));
```

$$35x^9 - 15x^8 + 56x^7 - 17x^6 + 4x^5 + 11x^4 - 20x^3 + 13x^2 - 3x$$

```
> quo(p2,p1,x);sort(rem(p2,p1,x));
```

$$\frac{5}{7}x + \frac{15}{49}$$

$$-\frac{53}{49}x^3 + x^2 - \frac{53}{49}x + 1$$

```
> factor(p1);factor(p1,I);
```

$$x(7x-3)(1+x^2)$$

$$x(x-I)(x+I)(7x-3)$$

```
> pol:=6*x*y^5+12*y^4+14*y^3*x^3-15*x^2*y^3+9*x^3*y^2-35*x^4*y+21*x^5+y+21*x^5;
```

$$pol := 6xy^5 + 12y^4 + 14y^3x^3 - 15x^2y^3 + 9x^3y^2 - 35x^4y + 21x^5 + y + 21x^5$$

```
> sort(pol, [x,y], plex);
```

$$21x^5 - 35x^4y + 14x^3y^3 + 9x^3y^2 - 15x^2y^3 + 6xy^5 + 12y^4$$

```
> collect(pol, x);
```

$$21x^5 - 35x^4y + (9y^2 + 14y^3)x^3 - 15x^2y^3 + 6xy^5 + 12y^4$$

```
> r:=(x^2+3*x+2)/(x^2+5*x+6); numer(r);denom(r);
```

$$r := \frac{x^2 + 3x + 2}{x^2 + 5x + 6}$$

$$x^2 + 3x + 2$$

$$x^2 + 5x + 6$$

```
> normal(r);
```

$$\frac{x+1}{x+3}$$

```
> convert((x^3+x^2-x+1)/(-3*x+7*x^2-3*x^3+7*x^4), parfrac,x);
```

$$\frac{143}{87(7x-3)} - \frac{1}{3x} + \frac{1}{29} \frac{7x+3}{1+x^2}$$

```
> v:=(x+1)^(-2); numer(v)/expand(denom(v));
```

$$v := \frac{1}{(x+1)^2}$$

$$\frac{1}{x^2 + 2x + 1}$$

```
> (x-1)*(x+2)/((x+1)*x)+(x-1)/(1+x)^2; sort(normal(%), expanded);
```

$$\frac{(x-1)(x+2)}{(x+1)x} + \frac{x-1}{(x+1)^2}$$

$$\frac{x^3 + 3x^2 - 2x - 2}{x^3 + 2x^2 + x}$$

```
x = polygen(QQ, 'x')
```

```
p1=-3*x+7*x^2-3*x^3+7*x^4;p2=5*x^5+3*x^3+x^2-2*x+1;p1;p2  

$$7x^4 - 3x^3 + 7x^2 - 3x$$

$$5x^5 + 3x^3 + x^2 - 2x + 1$$

```

```
p1*p2;  

$$35x^9 - 15x^8 + 56x^7 - 17x^6 + 4x^5 + 11x^4 - 20x^3 + 13x^2 - 3x$$

```

```
(q,r) = p2.quo_rem(p1);q;r  

$$\frac{5}{7}x + \frac{15}{49}$$

$$-\frac{53}{49}x^3 + x^2 - \frac{53}{49}x + 1$$

```

```
factor(p1);maxima.gfactor(p1)  

$$(7) \cdot \left(x - \frac{3}{7}\right) \cdot x \cdot (x^2 + 1)$$

$$x(x-i)(x+i)(7x-3)$$

```

```
var('y'); x,y=polygens(QQ, 'x,y')
```

```
pol=6*x*y^5+12*y^4+14*y^3*x^3-15*x^2*y^3+9*x^3*y^2-35*x^4*y+21*x^5;pol  

$$14x^3y^3 + 6xy^5 + 21x^5 - 35x^4y + 9x^3y^2 - 15x^2y^3 + 12y^4$$

```

```
Ryplex.<x,y> = PolynomialRing(QQ, 2, order='invlex');Ryplex(pol)  

$$6xy^5 + 12y^4 + 14x^3y^3 - 15x^2y^3 + 9x^3y^2 - 35x^4y + 21x^5$$

```

```
Rlex.<x,y> = PolynomialRing(QQ, 2, order='lex');Rlex(pol)  

$$21x^5 - 35x^4y + 14x^3y^3 + 9x^3y^2 - 15x^2y^3 + 6xy^5 + 12y^4$$

```

```
pol.polynomial(pol.variables()[0])  

$$21x^5 - 35yx^4 + (14y^3 + 9y^2)x^3 - 15y^3x^2 + 6y^5x + 12y^4$$

```

```
reset();r=(x^2+3*x+2)/(x^2+5*x+6);r;r.numerator(normalize=False);r.\  
denominator(normalize=False);  

$$\frac{x^2 + 3x + 2}{x^2 + 5x + 6}$$

$$\frac{(x^2 + 3x + 2)}{x^2 + 5x + 6}$$

```

```
x=polygen(QQ, 'x');r=(x^2+3*x+2)/(x^2+5*x+6);r  

$$\frac{x+1}{x+3}$$

```

```
reset();((x^3+x^2-x+1)/(-3*x+7*x^2-3*x^3+7*x^4)).partial_fraction()  

$$\frac{7x+3}{29(x^2+1)} + \frac{143}{87(7x-3)} - \frac{1}{3x}$$

```

```
v=(x+1)^(-2);expand(v)  

$$\frac{1}{x^2 + 2x + 1}$$

```

```
(x-1)*(x+2)/((x+1)*x)+(x-1)/(1+x)^2  

$$\frac{(x+2)(x-1)}{(x+1)x} + \frac{x-1}{(x+1)^2}$$

```

```
x=polygen(QQ, 'x');(x-1)*(x+2)/((x+1)*x)+(x-1)/(1+x)^2  

$$\frac{x^3 + 3x^2 - 2x - 2}{x^3 + 2x^2 + x}$$

```