```
> 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;
```

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

```
> 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));
```

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

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

```
(%i1)  p1:-3*x+7*x^2-3*x^3+7*x^4;p2:5*x^5+3*x^3+x^2-2*x+1;
```

(%o1) $7\,x^4 - 3\,x^3 + 7\,x^2 - 3\,x$

(%o2) $5\,x^5 + 3\,x^3 + x^2 - 2\,x + 1$

```
(%i3)  expand(p1*p2);
```

(%o3) $35\,x^9 - 15\,x^8 + 56\,x^7 - 17\,x^6 + 4\,x^5 + 11\,x^4 - 20\,x^3 + 13\,x^2 - 3\,x$

```
(%i4)  quotient(p2,p1);remainder(p2,p1);
```

(%o4) $\dfrac{35\,x + 15}{49}$

(%o5) $-\dfrac{53\,x^3 - 49\,x^2 + 53\,x - 49}{49}$

```
(%i6)  factor(p1);gfactor(p1);
```

(%o6) $x\,\left(7\,x - 3\right)\,\left(x^2 + 1\right)$

(%o7) $x\,\left(x - i\right)\,\left(x + i\right)\,\left(7\,x - 3\right)$

```
(%i8)  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;
```

(%o8) $6\,x\,y^5 + 12\,y^4 + 14\,x^3\,y^3 - 15\,x^2\,y^3 + 9\,x^3\,y^2 - 35\,x^4\,y + 21\,x^5$

```
(%i9)  ordergreat(x,y);
```

(%o9) *done*

```
(%i10) 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;
```

(%o10) $21\,x^5 - 35\,y\,x^4 + 14\,y^3\,x^3 + 9\,y^2\,x^3 - 15\,y^3\,x^2 + 6\,y^5\,x + 12\,y^4$

```
(%i11) unorder();
```

(%o11) $[y, x]$

```
(%i12) collectterms(pol, x);
```

(%o12) $6\,x\,y^5 + 12\,y^4 + x^3\,\left(14\,y^3 + 9\,y^2\right) - 15\,x^2\,y^3 - 35\,x^4\,y + 21\,x^5$

```
(%i13) r:(x^2+3*x+2)/ (x^2+5*x+6); num(r);denom(r);
```

(%o13) $\dfrac{x^2 + 3\,x + 2}{x^2 + 5\,x + 6}$

(%o14) $x^2 + 3\,x + 2$

(%o15) $x^2 + 5\,x + 6$

```
(%i16) ratsimp(r);
```

(%o16) $\dfrac{x + 1}{x + 3}$

```
(%i17) partfrac((x^3+x^2-x+1)/(-3*x+7*x^2-3*x^3+7*x^4), x);
```

(%o17) $\dfrac{7\,x + 3}{29\,\left(x^2 + 1\right)} + \dfrac{143}{87\,\left(7\,x - 3\right)} - \dfrac{1}{3\,x}$

```
(%i18) expand((x+1)^(-2));
```

(%o18) $\dfrac{1}{x^2 + 2\,x + 1}$

```
(%i19) (x-1)*(x+2)/((x+1)*x)+(x-1)/(1+x)^2; ratsimp(%);
```

(%o19) $\dfrac{x - 1}{\left(x + 1\right)^2} + \dfrac{\left(x - 1\right)\,\left(x + 2\right)}{x\,\left(x + 1\right)}$

(%o20) $\dfrac{x^3 + 3\,x^2 - 2\,x - 2}{x^3 + 2\,x^2 + x}$