```
> a := (9*y - 7)*x + (5*y^2 + 12);
```
$$a := (9\,y - 7)\,x + 5\,y^2 + 12 \tag{1}$$

```
> b := (13*y+23)*x^2 + (21*y - 11)*x + (11*y - 13);
```
$$b := (13\,y + 23)\,x^2 + (21\,y - 11)\,x + 11\,y - 13 \tag{2}$$

```
> c := a * b;
```
$$c := \left((9\,y - 7)\,x + 5\,y^2 + 12 \right)\left((13\,y + 23)\,x^2 + (21\,y - 11)\,x + 11\,y - 13 \right) \tag{3}$$

```
> maple_answer := collect(expand(c), x);
```
$$maple\_answer := \left(117\,y^2 + 116\,y - 161\right) x^3 + \left(65\,y^3 + 304\,y^2 - 90\,y + 353\right) x^2 + \left(105\,y^3 \right.$$
$$\left. + 44\,y^2 + 58\,y - 41\right) x + 55\,y^3 - 65\,y^2 + 132\,y - 156 \tag{4}$$

```
> maxnorm(a)*maxnorm(b)*nops(a)*nops(b)*2;
  P := [23, 29, 31];
```
$$6624$$
$$P := [23, 29, 31] \tag{5}$$

```
> M := 1;
  eval_c_p := [];
  for p in P do
      M := M*p;
      c_y := []:
      eval_c_y := []:
      for i from 1 to (degree(a, y) + degree(b, y) + 1)  do
          c_y := [op(c_y), i];
          eval_a_y := eval(a, y=i) mod p;
          eval_b_y := eval(b, y=i) mod p;
          c_x := [];
          eval_c_x := [];
          for j from 1 to (degree(a, x) + degree(b, x) + 1) do
              c_x := [op(c_x), j];
              eval_a_x := eval(eval_a_y, x=j) mod p;
              eval_b_x := eval(eval_b_y, x=j) mod p;
              eval_c_x := [op(eval_c_x), (eval_a_x * eval_b_x) mod
  p];
          od;
          eval_c_y := [op(eval_c_y), interp(c_x, eval_c_x, x) mod
  p];
      od;
      eval_c_p := [op(eval_c_p), collect(interp(c_y, eval_c_y, y)
  mod p, x)];
  od;
  result := mods(collect(chrem(eval_c_p, P),x),M);
```
$$M := 1$$
$$eval\_c\_p := [\,]$$
$$M := 23$$
$$c\_y := [\,]$$
$$eval\_c\_y := [\,]$$
$$eval\_c\_p := \left[\left(2\,y^2 + y\right) x^3 + \left(19\,y^3 + 5\,y^2 + 2\,y + 8\right) x^2 + \left(13\,y^3 + 21\,y^2 + 12\,y + 5\right) x \right.$$
$$\left. + 9\,y^3 + 4\,y^2 + 17\,y + 5 \right]$$
$$M := 667$$
$$c\_y := [\,]$$

$$eval\_c\_y := [\ ]$$

$$eval\_c\_p := \left[\left(2\,y^2 + y\right) x^3 + \left(19\,y^3 + 5\,y^2 + 2\,y + 8\right) x^2 + \left(13\,y^3 + 21\,y^2 + 12\,y + 5\right) x\right.$$
$$+\, 9\,y^3 + 4\,y^2 + 17\,y + 5,\ \left(y^2 + 13\right) x^3 + \left(7\,y^3 + 14\,y^2 + 26\,y + 5\right) x^2 + \left(18\,y^3 + 15\,y^2\right.$$
$$\left.\left.+\, 17\right) x + 26\,y^3 + 22\,y^2 + 16\,y + 18\right]$$

$$M := 20677$$

$$c\_y := [\ ]$$

$$eval\_c\_y := [\ ]$$

$$eval\_c\_p := \left[\left(2\,y^2 + y\right) x^3 + \left(19\,y^3 + 5\,y^2 + 2\,y + 8\right) x^2 + \left(13\,y^3 + 21\,y^2 + 12\,y + 5\right) x\right.$$
$$+\, 9\,y^3 + 4\,y^2 + 17\,y + 5,\ \left(y^2 + 13\right) x^3 + \left(7\,y^3 + 14\,y^2 + 26\,y + 5\right) x^2 + \left(18\,y^3 + 15\,y^2\right.$$
$$+\, 17\right) x + 26\,y^3 + 22\,y^2 + 16\,y + 18,\ \left(24\,y^2 + 23\,y + 25\right) x^3 + \left(3\,y^3 + 25\,y^2 + 3\,y\right.$$
$$\left.\left.+\, 12\right) x^2 + \left(12\,y^3 + 13\,y^2 + 27\,y + 21\right) x + 24\,y^3 + 28\,y^2 + 8\,y + 30\right]$$

$$result := \left(117\,y^2 + 116\,y - 161\right) x^3 + \left(65\,y^3 + 304\,y^2 - 90\,y + 353\right) x^2 + \left(105\,y^3 + 44\,y^2\right.$$ **(6)**
$$\left.+\, 58\,y - 41\right) x + 55\,y^3 - 65\,y^2 + 132\,y - 156$$

```
> result - maple_answer
```

$$0$$ **(7)**