```
> ppcm_list := proc(list_elem)
        local start, i;
      start := list_elem[1];
      for i in list_elem do
         start := lcm(start, i);
      end do;
       return start;
   end proc;
```

```
ppcm_list := proc(list_elem)
    local start, i;
    start := list_elem[1]; for i in list_elem do start := lcm(start, i) end do; return start
end proc
```
(1)

```
lcm([5, 3, 8, 12])
```

$$[5, 3, 8, 12]$$ (2)

```
pgcd_list := proc(list_elem)
      local start, i;
    start := list_elem[1];
    for i in list_elem do
       start := gcd(start, i);
    end do;
     return start;
end proc;

crt_list := proc(list_xj, list_yj)
end proc;
pgcd_list := proc(list_elem)
    local start, i;
    start := list_elem[1]; for i in list_elem do start := gcd(start, i) end do; return start
end proc
```

```
crt_list := proc(list_xj, list_yj)  end proc
```
(3)

```
lcm(5, 3, 8, 12)
```

$$120$$ (4)

```
ppcm_all_but_i := proc(list_of_elem, i)
    local res, j; res := [ ];
    res := 1;
    for j from 1 to nops(list_of_elem) do
       if i ≠ j then
          res := [op(res), list_of_elem[j]];
       end if;
    end do;
    return ppcm_list(res);
end proc;
ppcm_all_but_i := proc(list_of_elem, i)
```
(5)

```
    local res, j;
    res := [ ];
    res := 1;
    for j to nops(list_of_elem) do if i<>j then res := [op(res), list_of_elem[j]] end if end do;
    return ppcm_list(res)
end proc
```

```
ppcm_list([3, 5, 8, 12])
```

120 **(6)**

```
IntersectGB := proc(list_of_ideals)
local i, h1, h2, g1, g2, p_sol1, poly_y_1, poly_y_2, poly_y_3, poly_x_1, poly_x_2, poly_x_3, pre_1,
    pre_2, sol_poly_1, pre_3, pre_4, C, sol_poly_2, sol_poly_22, hi := [ ], v_yj := [ ], xj := [ ];
 with(Groebner);
for i in list_of_ideals do
   Basis(i, plex(x, y));
end do;
for i in list_of_ideals do
  hi := [op(hi), i[1]]
end do;
 p_sol1 := ppcm_list(hi);
for i from 1 to nops(hi) do
  v_yj := [op(v_yj), simplify(p_sol1/ppcm_all_but_i(hi, i))];
end do;
y_star := pgcd_list(hi);
for i from 1 to nops(v_yj) do
  xj := [op(xj), rem(list_of_ideals[i][2], v_yj[i], y)];
end do;
 end proc;
```

```
Warning, (in IntersectGB) `y_star` is implicitly declared local
```

```
IntersectGB := proc(list_of_ideals)                                                    (7)
    local i, h1, h2, g1, g2, p_sol1, poly_y_1, poly_y_2, poly_y_3, poly_x_1, poly_x_2, poly_x_3,
    pre_1, pre_2, sol_poly_1, pre_3, pre_4, C, sol_poly_2, sol_poly_22, hi, v_yj, xj, y_star;
    hi := [ ];
    v_yj := [ ];
    xj := [ ];
    with(Groebner);
    for i in list_of_ideals do Groebner:-Basis(i, plex(x, y)) end do;
    for i in list_of_ideals do hi := [op(hi), i[1]] end do;
    p_sol1 := ppcm_list(hi);
    for i to nops(hi) do v_yj := [op(v_yj), simplify(p_sol1/ppcm_all_but_i(hi, i))] end do;
    y_star := pgcd_list(hi);
    for i to nops(v_yj) do
```

```
        xj := [op(xj), rem(list_of_ideals[i][2], v_yj[i], y)]
    end do
end proc
```

$G := [expand((y+1)\cdot(y+2)), x-y+1];$

$$G := [y^2+3y+2, x-y+1] \quad (8)$$

$H := [expand((y+1)\cdot(y+5)), x-y+3];$

$$H := [y^2+6y+5, x-y+3] \quad (9)$$

$V := [expand((y+1)\cdot(y+3)), x-y+2];$

$$V := [y^2+4y+3, x-y+2] \quad (10)$$

$IntersectGB([G, H, V])$

$$[x+3, x+8, x+5] \quad (11)$$

(y^2+4y+3)

$$y^2+4y+3 \quad (12)$$

$simplify((y^2+4y+3))$

$$y^2+4y+3 \quad (13)$$

$\underset{=}{\text{factoriser}}$

$$(y+1)\,(y+3) \quad (14)$$

$factor(y^2+6y+5)$

$$(y+1)\,(y+5) \quad (15)$$

$factor(y^2+3y+2)\,(y^2+6y+5)$

$$(y+1)\,(y+2)\,(y^2+6y+5) \quad (16)$$

$factor((y^2+3y+2)\,(y^2+6y+5))$

$$(y+1)^2\,(y+2)\,(y+5) \quad (17)$$

$factor((y+2)\,(y+5)\,(y^2+4y+3))$

$$(y+2)\,(y+5)\,(y+3)\,(y+1) \quad (18)$$

$factor(y^2+4y+3)$

$$(y+1)\,(y+3) \quad (19)$$

$factor(y^2+6y+5)$

$$(y+1)\,(y+5) \quad (20)$$

$rem(x-y+1, y+2, y)$

$$x+3 \quad (21)$$