Maple Code

```
> `type/unipoly` := proc(f) type(f,list([integer,nonnegint])) end:
> AddPol := proc( f::unipoly, g::unipoly ) local m,n,h,i,j,k,c;
      m,n := nops(f),nops(g);
      h := Array(1..m+n);
      i,j,k := 1,1,0;
      while i<=m and j<=n do                      ← Copy fᵢ into h.
          if f[i][2]>g[j][2] then k++; h[k] := f[i]; i++;
          elif f[i][2]<g[j][2] then k++; h[k] := g[j]; j++;
          else c := f[i][1]+g[j][1];
              if c<>0 then k++; h[k] := [c,f[i][2]]; fi;
              i++; j++;
          fi;
      od;
      while i<=m do k++; h[k] := f[i]; i++; od;
      while j<=n do k++; h[k] := g[j]; j++; od;
      h := [seq( h[i], i=1..k )];
  end:
> MAPLE2SPARSE := proc(f,x) local cofs,mons,i;
      cofs := coeffs(f,x,'mons'); cofs,mons := [cofs],[mons];      Forgot to sort.
      [seq( [cofs[i],degree(mons[i],x)], i=1..nops(cofs) )];
  end:
  SPARSE2MAPLE := proc(f,x) local t;
      add( t[1]*x^t[2], t in f );
  end:
> f := 2*x^3+4*x+3*x^2;
  F := MAPLE2SPARSE(f,x);
```

$$f := 2x^3 + 3x^2 + 4x$$
$$F := [[2,3],[3,2],[4,1]] \tag{1}$$

```
> g := 3*x^4-3*x^2+x^3-2*x;
  G := MAPLE2SPARSE(g,x);
```

$$g := 3x^4 + x^3 - 3x^2 - 2x$$
$$G := [[3,4],[1,3],[-3,2],[-2,1]] \tag{2}$$

```
> H := AddPol(F,G);
  SPARSE2MAPLE(H,x);
  f+g;
```

$$H := [[3,4],[3,3],[2,1]]$$
$$3x^4 + 3x^3 + 2x$$
$$3x^4 + 3x^3 + 2x \tag{3}$$

```
> MulPol := proc(f::unipoly,g::unipoly) local h,s,t,T;
      h := [];  # h = 0                    s = fᵢ = [c,e]
      for s in f do
          T := [seq( [s[1]*t[1], s[2]+t[2]], t in g )];
          h := AddPol(h,T);                        g
      od;                               [c,e] × [[c₁,e₁],[c₂,e₂],...,[cₙ,eₙ]].
      h;
  end:
> H := MulPol(F,G);
  SPARSE2MAPLE(H,x);
  expand(f*g);
```

$$H := [[6,7],[11,6],[9,5],[-9,4],[-18,3],[-8,2]]$$
$$6x^7 + 11x^6 + 9x^5 - 9x^4 - 18x^3 - 8x^2$$
$$6x^7 + 11x^6 + 9x^5 - 9x^4 - 18x^3 - 8x^2 \tag{4}$$