In[134]:=
```
m = 10;
n = 4;
XY = {{-2, 5}, {1, 3}, {2, -1}, {3, 0}, {4, 1}, {5, 9}, {6, 0}, {7, 2}, {8, 6}, {-1, -4}};
B = Table[Table[0, {i, 1, n}], {j, 1, n}];
MatrixForm[XY]
p[x_] = a[0] + a[1] x + a[2] x^2 + a[3] x^3;
S = Sum[(XY[[i, 2]] - p[XY[[i, 1]]])^2, {i, 1, m}];
A = Table[FullSimplify[D[S, a[i]]], {i, 0, 3}]
Do[
 B[[i]] = Coefficient[A[[i]], Table[a[j], {j, 0, 3}]]
 , {i, 1, n}]
MatrixForm[B]
Do[
 h[i] = FullSimplify[A[[i]] - Sum[B[[i, j]] * a[j - 1], {j, 1, 4}]]; Print[h[i]], {i, 1, 4}]
b = Table[h[i], {i, 1, 4}];
a = N[LinearSolve[B, b]]
App[x_] = a[[1]] + a[[2]] x + a[[3]] x^2 + a[[4]] x^3
R1 = ListPlot[XY];
R2 = Plot[App[x], {x, -2, 8}];
Show[R1, R2]
```

Out[138]//MatrixForm=

$$\begin{pmatrix} -2 & 5 \\ 1 & 3 \\ 2 & -1 \\ 3 & 0 \\ 4 & 1 \\ 5 & 9 \\ 6 & 0 \\ 7 & 2 \\ 8 & 6 \\ -1 & -4 \end{pmatrix}$$

Out[141]=
```
{-42 + 20 {0.336601, 0.489314, -0.408443, 0.0348495}[0] +
  66 {0.336601, 0.489314, -0.408443, 0.0348495}[1] +
  418 {0.336601, 0.489314, -0.408443, 0.0348495}[2] +
  2574 {0.336601, 0.489314, -0.408443, 0.0348495}[3],
 -212 + 66 {0.336601, 0.489314, -0.408443, 0.0348495}[0] +
  418 {0.336601, 0.489314, -0.408443, 0.0348495}[1] +
  2574 {0.336601, 0.489314, -0.408443, 0.0348495}[2] +
  17 578 {0.336601, 0.489314, -0.408443, 0.0348495}[3],
 2 (-738 + 209 {0.336601, 0.489314, -0.408443, 0.0348495}[0] +
    1287 {0.336601, 0.489314, -0.408443, 0.0348495}[1] +
    8789 {0.336601, 0.489314, -0.408443, 0.0348495}[2] +
    61 743 {0.336601, 0.489314, -0.408443, 0.0348495}[3]),
 22 (-446 + 117 {0.336601, 0.489314, -0.408443, 0.0348495}[0] +
    799 {0.336601, 0.489314, -0.408443, 0.0348495}[1] +
    5613 {0.336601, 0.489314, -0.408443, 0.0348495}[2] +
    40 639 {0.336601, 0.489314, -0.408443, 0.0348495}[3])}
```

Out[143]//MatrixForm=

$$\begin{pmatrix} 20 & 66 & 418 & 2574 \\ 66 & 418 & 2574 & 17\,578 \\ 418 & 2574 & 17\,578 & 123\,486 \\ 2574 & 17\,578 & 123\,486 & 894\,058 \end{pmatrix}$$

-42

-212

-1476

-9812

Out[146]= {0.336601, 0.489314, −0.408443, 0.0348495}

Out[147]= $0.336601 + 0.489314\, x - 0.408443\, x^2 + 0.0348495\, x^3$

Out[150]=