In[1]:=
```
Clear[f1, g1, g2, g3, g4, g5, g6, g7]

f1 = -2 Cos[x1] + 6 x1^2 x2 - 0.75 x2

g1 = 4 x1^2 + 10 x1 x2 - 1
g2 = -4 x1 + 6 x2^2 - 14
g3 = 6 x1^2 + 5 x1 + 12 x2 - 20
g4 = -2 - x1
g5 = x1 - 2
g6 = -2 - x2
g7 = x2 - 2
```

Out[2]= $-0.75\,x2 + 6\,x1^2\,x2 - 2\,\text{Cos}[x1]$

Out[3]= $-1 + 4\,x1^2 + 10\,x1\,x2$

Out[4]= $-14 - 4\,x1 + 6\,x2^2$

Out[5]= $-20 + 5\,x1 + 6\,x1^2 + 12\,x2$

Out[6]= $-2 - x1$

Out[7]= $-2 + x1$

Out[8]= $-2 - x2$

Out[9]= $-2 + x2$

```
L = -f1 + u1 (g1 + s1^2) + u2 (g2 + s2^2) + u3 (g3 + s3^2) +
    u4 (-2 - x1 + s4^2) + u5 (x1 - 2 + s5^2) + u6 (-2 - x2 + s6^2) + u7 (x2 - 2 + s7^2);

lx1 = D[L, x1]
lx2 = D[L, x2]
lu1 = D[L, u1]
lu2 = D[L, u2]
lu3 = D[L, u3]
lu4 = D[L, u4]
lu5 = D[L, u5]
lu6 = D[L, u6]
lu7 = D[L, u7]
ls1 = D[L, s1]
ls2 = D[L, s2]
ls3 = D[L, s3]
ls4 = D[L, s4]
ls5 = D[L, s5]
ls6 = D[L, s6]
ls7 = D[L, s7]
```

Out[11]= $-4\,u2 - u4 + u5 + u3\,(5 + 12\,x1) - 12\,x1\,x2 + u1\,(8\,x1 + 10\,x2) - 2\,\text{Sin}[x1]$

Out[12]= $0.75 + 12\,u3 - u6 + u7 + 10\,u1\,x1 - 6\,x1^2 + 12\,u2\,x2$

Out[13]= $-1 + s1^2 + 4\,x1^2 + 10\,x1\,x2$

Out[14]= $-14 + s2^2 - 4\,x1 + 6\,x2^2$

Out[15]= $-20 + s3^2 + 5\,x1 + 6\,x1^2 + 12\,x2$

Out[16]= $-2 + s4^2 - x1$

Out[17]= $-2 + s5^2 + x1$

Out[18]= $-2 + s6^2 - x2$

Out[19]= $-2 + s7^2 + x2$

Out[20]= $2\,s1\,u1$

Out[21]= $2\,s2\,u2$

Out[22]= $2\,s3\,u3$

Out[23]= $2\,s4\,u4$

Out[24]= $2\,s5\,u5$

Out[25]= $2\,s6\,u6$

Out[26]= $2\,s7\,u7$

In[48]:=
```
L = -f1 + u1 (g1 + s1) + u2 (g2 + s2) + u3 (g3 + s3) +
    u4 (-2 - x1 + s4) + u5 (x1 - 2 + s5) + u6 (-2 - x2 + s6) + u7 (x2 - 2 + s7);

lx1 = D[L, x1];
lx2 = D[L, x2];
lu1 = D[L, u1];
lu2 = D[L, u2];
lu3 = D[L, u3];
lu4 = D[L, u4];
lu5 = D[L, u5];
lu6 = D[L, u6];
lu7 = D[L, u7];
ls1 = D[L, s1];
ls2 = D[L, s2];
ls3 = D[L, s3];
ls4 = D[L, s4];
ls5 = D[L, s5];
ls6 = D[L, s6];
ls7 = D[L, s7];
```

In[44]:=
```
case1 =
 NSolve[{lx1 == 0, lx2 == 0, lu1 == 0, lu2 == 0, lu3 == 0, lu4 == 0, lu5 == 0, lu6 == 0, lu7 == 0} /.
   {u1 → 0, s2 → 0, s3 → 0, u4 → 0, u5 → 0, u6 → 0, u7 → 0}, {x1, x2, s1, u2, u3, s4, s5, s6, s7}]
```

Out[44]=
```
{{x1 → -2.65461, x2 → -0.750728, s1 → -47.1168, u2 → -4.798,
  u3 → -0.141006, s4 → -0.654612, s5 → 4.65461, s6 → 1.24927, s7 → 2.75073},
 {x1 → 0.191234, x2 → 1.5687, s1 → -2.14616, u2 → -0.278601, u3 → 0.392827,
  s4 → 2.19123, s5 → 1.80877, s6 → 3.5687, s7 → 0.431299},
 {x1 → 2.31164, x2 → -1.96836, s1 → 25.1266, u2 → -2.29231, u3 → -1.90274,
  s4 → 4.31164, s5 → -0.31164, s6 → 0.0316437, s7 → 3.96836},
 {x1 → -1.51493, x2 → 1.15038, s1 → 9.24745, u2 → -0.771472, u3 → 1.97249,
  s4 → 0.485072, s5 → 3.51493, s6 → 3.15038, s7 → 0.849617}}
```

In[45]:=
```
case2 =
 NSolve[{lx1 == 0, lx2 == 0, lu1 == 0, lu2 == 0, lu3 == 0, lu4 == 0, lu5 == 0, lu6 == 0, lu7 == 0} /.
   {u1 → 0, s2 → 0, s5 → 0, u4 → 0, u3 → 0, u6 → 0, u7 → 0}, {x1, x2, s1, s3, u2, u5, s4, s6, s7}]
```

Out[45]=
```
{{x1 → 2., x2 → -1.91485, s1 → 23.2971, s3 → 8.97825,
  u2 → -1.01183, u5 → -48.1852, s4 → 4., s6 → 0.0851458, s7 → 3.91485},
 {x1 → 2., x2 → 1.91485, s1 → -53.2971, s3 → -36.9783, u2 → 1.01183,
  u5 → 51.8224, s4 → 4., s6 → 3.91485, s7 → 0.0851458}}
```

In[47]:=
```
case3 =
 NSolve[{lx1 == 0, lx2 == 0, lu1 == 0, lu2 == 0, lu3 == 0, lu4 == 0, lu5 == 0, lu6 == 0, lu7 == 0} /.
   {u5 → 0, s1 → 0, s2 → 0, u4 → 0, u3 → 0, u6 → 0, u7 → 0}, {x1, x2, s5, s3, u2, u1, s4, s6, s7}]
```

Out[47]=
```
{{x1 → 6.49039, x2 → -2.58075, s5 → -4.49039, s3 → -234.234,
  u2 → -35.6913, u1 → -13.1475, s4 → 8.49039, s6 → -0.580748, s7 → 4.58075},
 {x1 → 0.0638196, x2 → 1.54139, s5 → 1.93618, s3 → 1.1598, u2 → -0.0416993,
  u1 → 0.0716637, s4 → 2.06382, s6 → 3.54139, s7 → 0.458611},
 {x1 → -0.0649659, x2 → -1.51328, s5 → 2.06497, s3 → 38.4589, u2 → 0.0426964,
  u1 → -0.0779864, s4 → 1.93503, s6 → 0.486718, s7 → 3.51328},
 {x1 → -2.32257, x2 → 0.885974, s5 → 4.32257, s3 → -11.3849, u2 → 4.66124,
  u1 → 0.772451, s4 → -0.322575, s6 → 2.88597, s7 → 1.11403}}
```