

```

DATA C;
INFILE squid;
INPUT x1 x2 x3 x4 x5 y;

proc NLIN method=GAUSS;
model y=a*x1+exp(b*x2)+c;
parameters a=1, b=1, c=0;

der.a = x1;
der.b = exp(b*x2)*x2;
der.c = 1;

run;

```

} Partial
derivatives

```

Non-Linear Least Squares Iterative Phase
Dependent Variable Y      Method: Gauss-Newton
Iter      A              B              C Sum of Squares
0          1.000000      1.000000      0      89.993753
1          6.310562      0.877580     -8.184051    16.163552
2          6.397452      0.845963     -8.228067    16.067504
3          6.418003      0.841275     -8.242082    16.067027
4          6.421016      0.840711     -8.244281    16.067024
5          6.421379      0.840645     -8.244547    16.067024

```

NOTE: Convergence criterion met.

Non-Linear Least Squares Summary Statistics Dependent Variable Y

Source	DF	Sum of Squares	Mean Square
Regression	3	587.01427612	195.67142537
Residual	19	16.06702388	0.84563284
Uncorrected Total	22	603.08130000	
(Corrected Total)	21	215.92475000	

Parameter	Estimate	Asymptotic Std. Error	Asymptotic 95 % Confidence Interval	
			Lower	Upper
A	6.421378626	1.9352691460	2.370842695	10.471914557
B	0.840644982	0.3336459992	0.142320870	1.538969094
C	-8.244547413	1.6081107793	-11.610337906	-4.878756920

Asymptotic Correlation Matrix

Corr	A	B	C
A	1	-0.956849766	-0.961878292
B	-0.956849766	1	0.8492386362
C	-0.961878292	0.8492386362	1

```
PROC NLIN;
model systol=a+exp(b*weight);
parms a=0, b=1; title 'UNLUCKY INITIAL PARAMETERS';
der.a = x1; der.b = exp(b*x2)*x2; der.c = 1;
```

Results may
depend on
initial values

```
PROC NLIN;
model systol=a+exp(b*weight);
parms a=0, b=0; title 'LUCKY INITIAL PARAMETERS';
der.a = x1; der.b = exp(b*x2)*x2; der.c = 1;
```

```

UNLUCKY INITIAL PARAMETERS
DUD      A      B Sum of Squares
-3        0      1.000000 3.69181433E75
-2      0.100000 1.000000 3.69181433E75
-1        0      1.100000 1.33034364E83
 0        0      1.000000 3.69181433E75
 1        0      0.999983 3.68112698E75
.....
50        0      0.686092 7.01623013E51
51        0      0.679778 2.33874338E51
WARNING: PROC NLIN failed to converge.
```

```

LUCKY INITIAL PARAMETERS
DUD      A      B Sum of Squares
-3        0        0      629734
-2      0.100000      0      628748
-1        0      0.100000 48891662
 0      0.100000      0      628748
 1    121.649234      0.000628 7398.070407
.....
15    110.052589      0.044337 4812.211786
16    110.074308      0.044319 4812.207328
17    110.074121      0.044320 4812.207328
NOTE: Convergence criterion met.
```

```
proc NLIN method=GAUSS;
model y=a*x1+exp(b*x2)+c;
parameters a=0 to 10, b=0.5 to 1 by 0.1, c=0,3,-5;
der.a = x1; der.b = exp(b*x2)*x2; der.c = 1; run;
```

Solution:
Grid method

```

Non-Linear Least Squares Grid Search
      A      B      C Sum of Squares
      0      0.500000      0      293.741222
1.000000      0.500000      0      154.413829
2.000000      0.500000      0      115.396435
.....
1.000000      0.700000      0      116.979572
2.000000      0.700000      0      119.137212

Dependent Variable Y      Method: Gauss-Newton
Iter      A      B      C Sum of Squares
 0      4.000000      1.000000      -5.000000      25.208158
 1      6.310562      0.877580      -8.184051      16.163552
 2      6.397452      0.845963      -8.228067      16.067504
 3      6.418003      0.841275      -8.242082      16.067027
 4      6.421016      0.840711      -8.244281      16.067024
 5      6.421379      0.840645      -8.244547      16.067024
NOTE: Convergence criterion met.
```