PROC NLP: Nonlinear Minimization

Gradient is computed using analytic formulas.
Jacobian of nonlinear constraints is computed using analytic formulas.

PROC NLP: Nonlinear Minimization

Optimization Start
Parameter Estimates

N	Parameter	Estimate	Gradient Objective Function	Gradient Lagrange Function	Lower Bound Constraint	Upper Bound Constraint	Active Bound Constraint
1	x	0	-2.493178	0	0	.	Lower BC
2	y	0	-2.518756	0	0	.	Lower BC

Value of Objective Function = 143.26404365

Value of Lagrange Function = 143.26404365

Values of Nonlinear Constraints

	Constraint	Value	Residual	Lagrange Multiplier		
[1]	c1_L	5.2769	-5.2769	.	Violat. NLIC	LinDep
[2]	c2_L	-15.8132	15.8132	.		
[3]	c3_L	-22.2800	22.2800	.		
[4]	c4_L	16.0803	-16.0803	.	Violat. NLIC	LinDep

Linearly Dependent Gradients of Active Nonlinear Constraints

Parameter	N
c1_L	1
c2_L	4

PROC NLP: Nonlinear Minimization

Dual Quasi-Newton Optimization

Modified VMCWD Algorithm of Powell (1978, 1982)

Dual Broyden - Fletcher - Goldfarb - Shanno Update (DBFGS)
Lagrange Multiplier Update of Powell(1982)

Parameter Estimates	2
Lower Bounds	2
Upper Bounds	0
Nonlinear Constraints	4

Optimization Start

Objective Function 93.779712473 Maximum Constraint Violation 1.1543057E-6
Maximum Gradient of the Lagran Func 1.0020745283

Iter	Restarts	Function Calls	Objective Function	Maximum Constraint Violation	Predicted Function Reduction	Step Size	Maximum Gradient Element of the Lagrange Function
1	0	13	90.72678	0	12.6762	1.000	1.244
2	0	14	82.88197	0	0.7196	1.000	0.406
3	0	15	82.50229	0	0.6412	1.000	0.351
4	0	16	81.99575	0	0.5150	1.000	0.199
5	0	17	81.99054	0	1.2400	1.000	0.870
6	0	19	81.78003	0	0.00648	0.538	0.0800
7	0	20	81.77412	0	0.0355	1.000	0.0759
8	0	22	81.76792	0	0.0232	0.240	0.0300
9	0	24	81.76361	0	0.00485	0.266	0.0209
10	0	25	81.76125	0	0.000133	1.000	0.0143
11	0	27	81.76123	0	1.077E-6	0.298	0.00031
12	0	28	81.76123	0	3.128E-9	1.000	0.00012

Optimization Results

Iterations	12	Function Calls	29
Gradient Calls	15	Active Constraints	0
Objective Function	81.761226037	Maximum Constraint Violation	0
Maximum Projected Gradient	0.0001217296	Value Lagrange Function	81.761226037
Maximum Gradient of the Lagran Func	0.0001217296	Slope of Search Direction	-3.12818E-9

FCONV2 convergence criterion satisfied.

PROC NLP: Nonlinear Minimization

Optimization Results
Parameter Estimates

N	Parameter	Estimate	Gradient Objective Function	Gradient Lagrange Function
1	x	12.200048	0.000003695	0.000003695
2	y	20.999976	-0.000122	-0.000122

Value of Objective Function = 81.761226037

Value of Lagrange Function = 81.761226037

Values of Nonlinear Constraints

	Constraint	Value	Residual	Lagrange Multiplier
[1]	c1_L	-14.9432	14.9432	.
[2]	c2_L	-39.8000	39.8000	.
[3]	c3_L	-23.2955	23.2955	.
[4]	c4_L	-0.2000	0.2000	.

PROC NLP: Nonlinear Minimization

Gradient is computed using finite difference approximations (2).

PROC NLP: Nonlinear Minimization

Optimization Start
Parameter Estimates

N	Parameter	Estimate	Gradient Objective Function	Lower Bound Constraint	Upper Bound Constraint	Active Bound Constraint
1	x	0	-2.493178	0	.	Lower BC
2	y	0	-2.518756	0	.	Lower BC

Value of Objective Function = 143.26404365

Values of Nonlinear Constraints

	Constraint	Value	Residual	
[1]	c1_L	5.2769	-5.2769	Violat. NLIC
[2]	c2_L	-15.8132	15.8132	
[3]	c3_L	-22.2800	22.2800	
[4]	c4_L	16.0803	-16.0803	Violat. NLIC

PROC NLP: Nonlinear Minimization

Nelder-Mead Simplex Optimization

COBYLA Algorithm by M.J.D. Powell (1992)

Parameter Estimates	2
Lower Bounds	2
Upper Bounds	0
Nonlinear Constraints	4

Optimization Start

Objective Function 140.7650355 Maximum Constraint Violation 15.430136208

Iter	Restarts	Function Calls	Objective Function	Maximum Constraint Violation	Merit Function	Merit Function Change	Ratio Between Actual and Predicted Change
1	0	19	82.69758	0	82.6976	58.067	4.000
2	0	25	81.84159	0	81.8416	0.856	1.000
3	0	29	81.79507	0	81.7951	0.0465	0.250
4	0	39	81.76485	0	81.7648	0.0302	0.0938
5	0	43	81.76383	0	81.7638	0.00102	0.0234
6	0	54	81.76204	0	81.7620	0.00178	0.0198
7	0	64	81.76157	0	81.7616	0.00047	0.0167
8	0	67	81.76155	0	81.7616	0.00001	0.0042
9	0	82	81.76140	0	81.7614	0.00015	0.0023

10	0	102	81.76126	0	81.7613	0.00014	0.0067
11	0	106	81.76125	0	81.7612	0.00001	0.0017
12	0	119	81.76124	0	81.7612	0.00001	0.0014
13	0	123	81.76124	0	81.7612	8.12E-7	0.0004
14	0	151	81.76123	0	81.7612	6.97E-6	0.0005
15	0	167	81.76123	0	81.7612	2.85E-6	0.0010
16	0	171	81.76123	0	81.7612	1.31E-7	0.0002
17	0	186	81.76123	0	81.7612	1.35E-6	0.0008
18	0	190	81.76123	0	81.7612	1.02E-7	0.0003
19	0	193	81.76123	0	81.7612	3.94E-8	0.0001

Optimization Results

Iterations	19	Function Calls	194
Restarts	0	Objective Function	81.761226441
Maximum Constraint Violation	0	Merit Function	81.761226441
Actual Over Pred Change	0.0001		

ABSXCONV convergence criterion satisfied.

PROC NLP: Nonlinear Minimization

Optimization Results
Parameter Estimates

N	Parameter	Estimate	Gradient Objective Function
1	x	12.202942	0.000267
2	y	20.999919	-0.000321

Value of Objective Function = 81.761226441

Values of Nonlinear Constraints

	Constraint	Value	Residual
[1]	c1_L	-14.9423	14.9423
[2]	c2_L	-39.7971	39.7971
[3]	c3_L	-23.2964	23.2964
[4]	c4_L	-0.2029	0.2029