

MINIMIZE $C \cdot R$

where $C = (1 \ 1 \ 1 \ 1 \ 1)$

Subject to:

$A \cdot X \geq B$

⑥ $1 \ 2 \ 3 \ 4 \ 5 \geq 5$

⑦ $5 \ 1 \ 2 \ 3 \ 4 \geq 5$

⑧ $4 \ 5 \ 1 \ 2 \ 3 \geq 5$

⑨ $3 \ 4 \ 5 \ 1 \ 2 \geq 5$

⑩ $2 \ 3 \ 4 \ 5 \ 1 \geq 5$

Nomenclature:

OBJ = C = OBJECTIVE VECTOR

GMA = GAMMA MATRIX

GVA = GAMMA VECTOR

RVA = R VECTOR

GAMMA TEST = GVA * CURRENT CONSTRAINT

GRADIENT = GVA * GBJ

| | | | | | | | | | |
|--------------------------|---|------|---|------|---|------|--|------|------|
| NUMBER OF VARIABLES | = | 5 | | | | | | | |
| NUMBER OF CONSTRAINTS | = | 5 | | | | | | | |
| STARTING INDEX | = | 2 | 3 | 4 | 5 | 6 | | | |
| STARTING R VECTOR | = | 5.00 | | 0.00 | | 0.00 | | 0.00 | 0.00 |
| STARTING OBJECTIVE VALUE | = | 5.00 | | | | | | | |

NOTE: CONSTRAINTS NUMBER 1 THROUGH 5 ARE
THE COORDINATE CONSTRAINTS ($X_i \geq 0$)

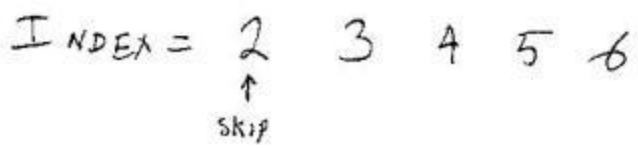
***** NEW ITERATION *****

ITERATION COUNT = 1

GAMMA VECTOR NUMBER = 1

| | | | | | | | |
|---|------------------|--------------|-----------------------|------------|-----------|-----------|-----------|
| ① | (CONSTRAINT # 3) | GMA = | 0.0000000 | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 |
| | (# 4) | GMA = | 0.0000000 | 0.0000000 | 0.0000000 | 1.0000000 | 0.0000000 |
| | (# 5) | GMA = | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 1.0000000 |
| | * (# 6) | GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 |
| | | GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 |
| | ② | GMA = | 0.0000000 | 0.0000000 | 0.0000000 | 1.0000000 | 3.0000000 |
| | | GMA = | 0.0000000 | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 |
| | | GMA = | -0.2000000 | -0.4000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| | ③ | GVA = | -0.4000000 | 0.2000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| | ④ | GAMMA TEST = | 0.200000000000000000 | | | | |
| | ⑤ | GVA = | -0.4000000 | 0.2000000 | 0.0000000 | 0.0000000 | 3.0000000 |
| | ⑥ | GRADIENT = | -0.200000000000000000 | | | | |

- ① GMA CONSISTS OF ALL THE INDEX CONSTRAINTS TAKEN FOUR AT A TIME (PER GVA CALCULATION) EXCEPT THAT THE CURRENT ACTIVE CONSTRAINT IS ALWAYS IN THE LAST ROW OF GMA. ALTHOUGH NOT DEMONSTRATED IN THIS PROGRAM, PARTS OF THE REDUCED GMA CAN BE REUSED THUS SAVING GVA CALCULATION TIME. GMA = $N \times (N-1)$ MATRIX.
 - ② THIS IS THE "REDUCED" GMA READY FOR GVA CALCULATION
 - ③ THIS IS THE "RAW" GAMMA VECTOR
 - ④ GAMMA TEST DETERMINES IF GVA IS POINTING IN THE RIGHT DIRECTION
 - ⑤ THIS IS THE "DIRECTION CORRECTED" GVA - NO CORRECTION WAS REQUIRED IN THIS CASE SINCE GAMMA TEST > 0
 - ⑥ THIS IS THE DIRECTIONAL GRADIENT OF GVA • OBJ. MINIMIZATION WILL CONTINUE UNTIL ALL GRADIENT > 0
- * CURRENT ACTIVE CONSTRAINT
 ** REDUCED TO 0



```

ITERATION COUNT = 1
GAMMA VECTOR NUMBER = 2
#2 GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000
#4 GMA = 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000
#5 GMA = 0.0000000 0.0000000 0.0000000 0.0000000 1.0000000
#6 GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000

GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000
GMA = -0.2000000 -0.4000000 -0.6000000 0.0000000 0.0000000
GMA = 0.0000000 1.0000000 0.0000000 3.0000000 0.0000000

GVA = 1.0000000 0.0000000 -0.3333333 0.0000000 0.0000000
GAMMA TEST = -0.3333333333333333
① GVA = -1.0000000 0.0000000 0.3333333 0.0000000 0.0000000
GRADIENT = -0.6666666666666667

```

① NOTE THAT THE DIRECTION OF GVA HAS CHANGED

INDEX = 2 3 4 5 6
 ↑
 SKIP

INDEX = 2 3 4 5 6
 ↑
 SKIP

* CURRENT ACTIVE CONSTRAINT

```

ITERATION COUNT = 1
GAMMA VECTOR NUMBER = 4
(#2) GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000
(#3) GMA = 0.0000000 0.0000000 1.0000000 0.0000000 0.0000000
(#4) GMA = 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000
(#6) * GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
      GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
      GMA = 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000
      GMA = 0.0000000 0.0000000 1.0000000 0.0000000 0.0000000
      GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000
      GVA = 1.0000000 0.0000000 0.0000000 0.0000000 -0.2000000
GAMMA TEST = -0.20000000000000000
      GVA = -1.0000000 0.0000000 0.0000000 0.0000000 0.2000000
GRADIENT = -0.80000000000000000
CONSTRAINT NUMBER = 1 T VALUE = 5.000000
CONSTRAINT NUMBER = 7 T VALUE = 4.761905
CONSTRAINT NUMBER = 8 T VALUE = 4.411765
CONSTRAINT NUMBER = 9 T VALUE = 3.846154
CONSTRAINT NUMBER = 10 T VALUE = 2.777778 (MIN)
** INCOMING CONSTRAINT = 10
OUTGOING CONSTRAINT = 5
NEW INDEX = 2 3 4 6 10
NEW R VECTOR = 2.2222222 0.0000000 0.0000000 0.0000000
0.5555556
NEW OBJECTIVE FUNCTION VALUE = 2.7777777777777778
OLD INDEX = 2 3 4 5 6
  
```

NOTE: IN THIS PROGRAM, THE GAMMA VECTOR WITH THE MOST NEGATIVE GRADIENT IS USED FOR T VALUE COMPUTATION (GAMMA VECTOR # 4 IN THIS CASE)

NOTE: THE CURRENT ACTIVE CONSTRAINT CHANGES EACH ITERATION

** NEW CURRENT ACTIVE CONSTRAINT

***** NEW ITERATION *****

```

ITERATION COUNT      =          2
GAMMA VECTOR NUMBER =          1
(# 3) GMA = 0.0000000  0.0000000  1.0000000  0.0000000  0.0000000
(# 4) GMA = 0.0000000  0.0000000  0.0000000  1.0000000  0.0000000
(# 6) GMA = 1.0000000  2.0000000  3.0000000  4.0000000  5.0000000
(# 10) * GMA = 2.0000000  3.0000000  4.0000000  5.0000000  1.0000000

GMA = 1.0000000  2.0000000  3.0000000  4.0000000  5.0000000
GMA = 1.8000000  2.6000000  3.4000000  4.2000000  0.0000000
GMA = 0.0000000  0.0000000  1.0000000  0.0000000  0.0000000
GMA = -0.4285714  -0.6190476  0.0000000  0.0000000  0.0000000

GVA = -0.6190476  0.4285714  0.0000000  0.0000000  -0.0476190

GAMMA TEST = 0.4285714285714286
GVA = -0.6190476  0.4285714  0.0000000  0.0000000  -0.0476190
GRADIENT = -0.2380952380952381
    
```

* CURRENT ACTIVE CONSTRAINT (CONSTRAINT # 10)

INDEX = 2 3 4 6 10
 ↑
 STEP

```

ITERATION COUNT = 2
GAMMA VECTOR NUMBER = 2
(#2) GMA = 0.0000000 1.0000000 0.0000000 3.0000000 0.0000000
(#4) GMA = 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000
(#6) GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
(#10) * GMA = 2.0000000 3.0000000 4.0000000 5.0000000 1.0000000

GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 1.8000000 2.6000000 3.4000000 4.2000000 0.0000000
GMA = -0.4285714 -0.6190476 -0.8095238 0.0000000 0.0000000
GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000

GVA = 1.0000000 0.0000000 -0.5294118 0.0000000 0.1176471
GAMMA TEST = -0.5294117647058823
GVA = -1.0000000 0.0000000 0.5294118 0.0000000 -0.1176471
GRADIENT = -0.5882352941176471

```

* CURRENT ACTIVE CONSTRAINT

```

INDEX = 2 3 4 6 10
        ↑
        STEP

```


INDEX = 2 3 4 6 10
 ↑
 SKIP

```

ITERATION COUNT = 2
GAMMA VECTOR NUMBER = 4 ①
(H2) GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000
(H3) GMA = 0.3000000 0.0000000 1.0000000 0.0000000 0.0000000
(H4) GMA = 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000
(H10) * GMA = 2.0000000 3.0000000 4.0000000 5.0000000 1.0000000
      GMA = 2.0000000 3.0000000 4.0000000 5.0000000 1.0000000
      GMA = 0.0000000 0.0000000 0.0000000 1.0000000 0.0000000
      GMA = 0.0000000 0.0000000 1.0000000 0.0000000 0.0000000
      GMA = 0.3000000 1.0000000 0.0000000 0.0000000 0.0000000
      GVA = 1.0000000 0.0000000 0.0000000 0.0000000 -2.0000000
GAMMA TEST = -9.000000000000000
      GVA = -1.0000000 0.0000000 0.0000000 0.0000000 2.0000000
GRADIENT = 1.000000000000000
CONSTRAINT NUMBER = 1 T VALUE = 2.222222
CONSTRAINT NUMBER = 5 T VALUE = 3.888889
② CONSTRAINT NUMBER = 7 T VALUE = 1.944444
CONSTRAINT NUMBER = 8 T VALUE = 1.555556
CONSTRAINT NUMBER = 9 T VALUE = 0.972222 (MIN)
** INCOMING CONSTRAINT = 9
OUTGOING CONSTRAINT = 4
NEW INDEX = 2 3 10 6 9
NEW R VECTOR = 1.2500000 0.0000000 0.0000000 0.4166667
0.4166667
NEW OBJECTIVE FUNCTION VALUE = 2.083333333333333
OLD INDEX = 2 3 4 6 10
  
```

① NOTE THAT THERE WILL BE 4 GVA's GENERATED PER ITERATION

* CURRENT ACTIVE CONSTRAINT

* * NEW CURRENT ACTIVE CONSTRAINT

② NOTE THAT IN THIS PROGRAM, THE GAMMA VECTOR WITH THE MOST NEGATIVE GRADIENT IS USED FOR T VALUE CALCULATIONS.

***** NEW ITERATION *****

| | | | | | | | | |
|-----|---------------------|--------------------|------------|-----------|------------|------------|------------|------------|
| | ITERATION COUNT | * | | 3 | | | | |
| | GAMMA VECTOR NUMBER | * | | 1 | | | | |
| #3 | GMA = | 0.0000000 | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| #10 | GMA = | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 | 1.0000000 | 1.0000000 |
| #6 | GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 | 0.0000000 | 0.0000000 |
| #9 | * GMA = | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 |
| | GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 | 0.0000000 | 0.0000000 |
| | GMA = | 1.8000000 | 2.6000000 | 3.4000000 | 4.2000000 | 5.0000000 | 0.0000000 | 0.0000000 |
| | GMA = | 2.8571429 | 3.5714286 | 4.2857143 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| | GMA = | -0.6666667 | -0.8333333 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| | GVA = | -0.8333333 | 0.6666667 | 0.0000000 | -0.0555556 | -0.0555556 | -0.0555556 | -0.0555556 |
| | GAMMA TEST = | 0.666666666666667 | | | | | | |
| | GVA = | -0.8333333 | 0.6666667 | 0.0000000 | -0.0555556 | -0.0555556 | -0.0555556 | -0.0555556 |
| | GRADIENT = | -0.277777777777778 | | | | | | |

INDEX = 2 3 10 6 9
 ↑
 SKIP

* CURRENT ACTIVE CONSTRAINT

```

ITERATION COUNT = 3
GAMMA VECTOR NUMBER = 2
R 2
R 10
R 6
R 9 *
GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000
GMA = 2.0000000 3.0000000 4.0000000 5.0000000 1.0000000
GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 3.0000000 4.0000000 5.0000000 1.0000000 2.0000000
GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 1.8000000 2.6000000 3.4000000 4.2000000 0.0000000
GMA = 2.9571429 3.5714286 4.2857143 0.0000000 0.0000000
GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000
GVA = 1.0000000 0.0000000 -0.6666667 0.1111111 0.1111111
GAMMA TEST = -0.6666666666666667
GVA = -1.0000000 0.0000000 0.6666667 -0.1111111 -0.1111111
GRADIENT = -0.5555555555555556

```

INDEX = 2 3 10 6 9
 ↑
 SKIP

* CURRENT ACTIVE CONSTRAINT

```

ITERATION COUNT = 3
GAMMA VECTOR NUMBER = 3
# 2
# 3
# 6
# 9
GMA = 0.0000000 1.0000000 3.0000000 0.0000000 0.0000000
GMA = 0.0000000 0.0000000 1.0000000 0.0000000 0.0000000
GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
* GMA = 3.0000000 4.0000000 5.0000000 1.0000000 2.0000000

GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 2.5000000 3.2000000 3.8000000 -0.6000000 0.0000000
GMA = 0.0000000 0.0000000 1.0000000 0.0000000 0.0000000
GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000

GVA = 1.0000000 0.0000000 0.0000000 4.3333333 -3.6666667
GAMMA TEST = 20.000000000000000
GVA = 1.0000000 0.0000000 0.0000000 4.3333333 -3.6666667
GRADIENT = 1.6666666666666667

```

INDEX = 2 3 10 6 9
 ↑
 SKIP

* CURRENT ACTIVE CONSTRAINT

INDEX = 2 3 10 6 9
 ↑
 SKIP

ITERATION COUNT = 3

GAMMA VECTOR NUMBER = 4

(#2)
 (#3)
 (#10)
 (#9)

| | | | | | |
|---------|-----------|-----------|-----------|-----------|-----------|
| GMA = | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| GMA = | 0.0000000 | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 |
| GMA = | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 |
| * GMA = | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 | 2.0000000 |
| GMA = | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 | 2.0000000 |
| GMA = | 0.5000000 | 1.0000000 | 1.5000000 | 4.5000000 | 0.3000000 |
| GMA = | 0.0000000 | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 |
| GMA = | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |

GVA = 1.0000000 0.0000000 0.0000000 -0.1111111 -1.4444444

GAMMA TEST = -6.666666666666667

SVA = -1.0000000 0.0000000 0.0000000 0.1111111 1.4444444

GRADIENT = 0.5555555555555556

| | | | |
|---------------------|---|-----------|----------------|
| CONSTRAINT NUMBER = | 1 | T VALUE = | 1.250000 |
| CONSTRAINT NUMBER = | 4 | T VALUE = | 3.750000 |
| CONSTRAINT NUMBER = | 5 | T VALUE = | 3.750000 |
| CONSTRAINT NUMBER = | 7 | T VALUE = | 0.937500 |
| CONSTRAINT NUMBER = | 8 | T VALUE = | 0.535714 (MIN) |

* * INCOMING CONSTRAINT = 8
 OUTGOING CONSTRAINT = 3

NEW INDEX = 2 9 10 6 8

NEW R VECTOR = 0.7142857 0.0000000 0.3571429 0.3571429
 0.3571429

NEW OBJECTIVE FUNCTION VALUE = 1.785714285714286



OLD INDEX = 2 3 10 6 9

* CURRENT ACTIVE CONSTRAINT

* * NEW CURRENT ACTIVE CONSTRAINT

***** NEW ITERATION *****

ITERATION COUNT = 4

GAMMA VECTOR NUMBER = 1

(#9)
(#10)
(#6)
(#8) *

| | | | | | |
|--------------|--------------------|------------|------------|------------|------------|
| GMA = | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 | 2.0000000 |
| GMA = | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 |
| GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 |
| GMA = | 4.0000000 | 3.0000000 | 1.0000000 | 2.0000000 | 3.0000000 |
| GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 |
| GMA = | 1.8000000 | 2.6000000 | 3.4000000 | 4.2000000 | 0.0000000 |
| GMA = | 2.8571429 | 3.5714286 | 4.2857143 | 0.0000000 | 0.0000000 |
| GMA = | 3.8888889 | 4.4444444 | 0.0000000 | 0.0000000 | 0.0000000 |
| GVA = | 4.4444444 | -3.8888889 | 0.2777778 | 0.2777778 | 0.2777778 |
| GAMMA TEST = | -3.888888888888889 | | | | |
| GVA = | -4.4444444 | 3.8888889 | -0.2777778 | -0.2777778 | -0.2777778 |
| GRADIENT = | -1.388888888888889 | | | | |

INDEX = 2 9 10 6 8
 ↑
 STEP

* CURRENT ACTIVE CONSTRAINT

```

ITERATION COUNT *          4
GAMMA VECTOR NUMBER =    2
(#2)  GMA = 0.0000000  1.0000000  0.0000000  0.0000000  0.0000000
(#10) GMA = 2.0000000  3.0000000  4.0000000  5.0000000  1.0000000
(#6)  GMA = 1.0000000  2.0000000  3.0000000  4.0000000  5.0000000
(#8)  * GMA = 4.0000000  5.0000000  1.0000000  2.0000000  3.0000000

GMA = 1.0000000  2.0000000  3.0000000  4.0000000  5.0000000
GMA = 1.8000000  2.6000000  3.4000000  4.2000000  3.0000000
GMA = 3.5714286  4.0476190 -0.4761905  0.0000000  0.0000000
GMA = 0.0000000  1.0000000  0.0000000  0.0000000  0.0000000

GVA = 1.0000000  0.0000000  7.5000000 -6.5000000  0.5000000

GAMMA TEST = 35.000000000000000
GVA = 1.0000000  0.0000000  7.5000000 -6.5000000  0.5000000

GRADIENT = 2.5000000000000000

```

INDEX = 2 9 10 6 8
 ↑
 SNIP

* CURRENT ACTIVE CONSTRAINT

ITERATION COUNT = 4

GAMMA VECTOR NUMBER = 3

| | | | | | | |
|------|--------------|--------------------|-----------|------------|------------|------------|
| (#2) | GMA * | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| (#9) | GMA * | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 | 2.0000000 |
| (#6) | GMA * | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 |
| (#8) | *GMA * | 4.0000000 | 5.0000000 | 1.0000000 | 2.0000000 | 3.0000000 |
| | GMA * | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 |
| | GMA * | 2.6666667 | 3.2000000 | 3.8000000 | -0.6000000 | 0.0000000 |
| | GMA * | 1.6666667 | 1.6666667 | -3.3333333 | 0.0000000 | 0.0000000 |
| | GMA * | 0.0000000 | 1.0000000 | 0.0000000 | 0.0000000 | 0.0000000 |
| | GVA * | 1.0000000 | 0.0000000 | 0.5000000 | 7.5000000 | -6.5000000 |
| | GAMMA TEST * | 35.000000000000000 | | | | |
| | GVA * | 1.0000000 | 0.0000000 | 0.5000000 | 7.5000000 | -6.5000000 |
| | GRADIENT * | 2.500000000000000 | | | | |

INDEX = 2 9 10 6 8
 ↑
 SMSP

* = CURRENT ACTIVE CONSTRAINT

INDEX = 2 9 10 6 8
 ↑
 STEP

```

ITERATION COUNT = 4
GAMMA VECTOR NUMBER = 4
  (#2) GMA = 0.0000000 1.0000000 3.0000000 0.0000000 0.0000000
  (#9) GMA = 3.0000000 4.0000000 5.0000000 1.0000000 2.0000000
  (#10) GMA = 2.0000000 3.0000000 4.0000000 5.0000000 1.0000000
  (#8) * GMA = 4.0000000 5.0000000 1.0000000 2.0000000 3.0000000

  GMA = 4.0000000 5.0000000 1.0000000 2.0000000 3.0000000
  GMA = 0.5666667 1.3333333 3.6666667 4.3333333 0.0000000
  GMA = 0.3846154 0.7692308 4.6153846 0.0000000 0.0000000
  GMA = 0.0000000 1.0000000 0.0000000 0.0000000 0.0000000

  GVA = 1.0000000 0.0000000 -0.0833333 -0.0833333 -1.2500000

  GAMMA TEST = -5.833333333333333

  GVA = -1.0000000 0.0000000 0.0833333 0.0833333 1.2500000

  GRADIENT = 0.416666666666667

  CONSTRAINT NUMBER = 1 T VALUE = 0.160714
  CONSTRAINT NUMBER = 3 T VALUE = 1.285714
  CONSTRAINT NUMBER = 4 T VALUE = 1.285714
  CONSTRAINT NUMBER = 5 T VALUE = 1.285714
  CONSTRAINT NUMBER = 7 T VALUE = 0.085714

  * * INCOMING CONSTRAINT = 7
  OUTGOING CONSTRAINT = 2
  NEW INDEX = 8 9 10 6 7
  NEW R VECTOR = 0.3333333 0.3333333 0.3333333 0.3333333
  0.3333333
  NEW OBJECTIVE FUNCTION VALUE = 1.666666666666667
  OLD INDEX = 2 9 10 6 8
  
```

* CURRENT ACTIVE CONSTRAINT

* * NEW CURRENT ACTIVE CONSTRAINT

***** NEW ITERATION *****

ITERATION COUNT = 5 (START OF FINAL ITERATION)

GAMMA VECTOR NUMBER = 1

| | | | | | | |
|-------|--------------|--------------------|------------|------------|------------|------------|
| (#9) | GMA = | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 | 2.0000000 |
| (#10) | GMA = | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 | 1.0000000 |
| (#16) | GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 3.0000000 |
| (#7) | * GMA = | 5.0000000 | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 |
| | GMA = | 1.0000000 | 2.0000000 | 3.0000000 | 4.0000000 | 5.0000000 |
| | GMA = | 1.8000000 | 2.6000000 | 3.4000000 | 4.2000000 | 0.0000000 |
| | GMA = | 2.8571429 | 3.5714286 | 4.2857143 | 0.0000000 | 0.0000000 |
| | GMA = | 4.4444444 | -0.2777778 | 0.0000000 | 0.0000000 | 0.0000000 |
| | GVA = | -0.2777778 | -4.4444444 | 3.8888889 | -0.2777778 | -0.2777778 |
| | GAMMA TEST = | -20.83333333333333 | | | | |
| | GVA = | 0.2777778 | 4.4444444 | -3.8888889 | 0.2777778 | 0.2777778 |
| | GRADIENT = | 1.38888888888889 | | | | |

NOTE: GRADIENT > 0

INDEX = 8 9 10 6 7
 ↑
 SKIP

* CURRENT ACTIVE CONSTRAINT

ITERATION COUNT = 5

GAMMA VECTOR NUMBER = 2

#8
#10
#6
#7

*
GMA = 4.0000000 5.0000000 1.0000000 2.0000000 3.0000000
GMA = 2.0000000 3.0000000 4.0000000 5.0000000 1.0000000
GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 5.0000000 1.0000000 2.0000000 3.0000000 4.0000000

GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 1.8000000 2.6000000 3.4000000 4.2000000 0.0000000
GMA = 3.5714286 4.0476190 -0.4761905 0.0000000 0.0000000
GMA = 2.5000000 -2.5000000 0.0000000 0.0000000 0.0000000

GVA = -2.5000000 -2.5000000 -40.0000000 35.0000000 -2.5000000

GAMMA TEST = -187.5000000000000

GVA = 2.5000000 2.5000000 40.0000000 -35.0000000 2.5000000

GRADIENT = 12.500000000000000

NOTE: GRADIENT > 0

INDEX = 8 9 10 6 7
 ↑
 SRFP

* CURRENT ACTIVE CONSTRAINT

ITERATION COUNT = 5

GAMMA VECTOR NUMBER = 3

#8
#9
#7

* GMA = 4.0000000 5.0000000 1.0000000 2.0000000 3.0000000
GMA = 3.0000000 4.0000000 5.0000000 1.0000000 2.0000000
GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
* GMA = 5.0000000 1.0000000 2.0000000 3.0000000 4.0000000

GMA = 1.0000000 2.0000000 3.0000000 4.0000000 5.0000000
GMA = 2.6000000 3.2000000 3.8000000 -0.6000000 0.0000000
GMA = 1.6666667 1.6666667 -3.3333333 0.0000000 0.0000000
GMA = 2.5000000 -2.5000000 0.0000000 0.0000000 3.0000000

GVA = -2.5000000 -2.5000000 -2.5000000 -40.0000000 35.0000000

GAMMA TEST = -187.5000000000000

GVA = 2.5000000 2.5000000 2.5000000 40.0000000 -35.0000000

GRADIENT = 12.500000000000000

NOTE: GRADIENT > 0

INDEX = 8 9 10 6 7
 ↑
 SKIP

* CURRENT ACTIVE CONSTRAINT

ITERATION COUNT = 5

GAMMA VECTOR NUMBER = 4

8
9
10
7

```
GMA = 4.0000000 5.0000000 1.0000000 2.0000000 3.0000000
GMA = 3.0000000 4.0000000 5.0000000 1.0000000 2.0000000
GMA = 2.0000000 3.0000000 4.0000000 5.0000000 1.0000000
* GMA = 5.0000000 1.0000000 2.0000000 3.0000000 4.0000000

GMA = 5.0000000 1.0000000 2.0000000 3.0000000 4.0000000
GMA = 0.7500000 2.7500000 3.5000000 4.2500000 0.0000000
GMA = 0.5882353 3.8235294 4.4117647 0.0000000 0.0000000
GMA = 0.3333333 4.6666667 0.0000000 0.0000000 0.0000000

GVA = 4.6666667 -0.3333333 -0.3333333 -0.3333333 -5.3333333

GAMMA TEST = -25.000000000000000

GVA = -4.6666667 0.3333333 0.3333333 0.3333333 5.3333333

GRADIENT = 1.666666666666667
```

NOTE: GRADIENT > 0

INDEX = 8 9 10 6 7
 ↑
 SKIP

* CURRENT ACTIVE CONSTRAINT

***** OPTIMUM SOLUTION *****

NUMBER OF ITERATIONS = 5
OBJECTIVE FUNCTION VALUE = 1.66
MINIMUM SLACK = -1.1102230246251565E-16
MAXIMUM SLACK = -1.1102230246251565E-16
INDEX CONSTRAINT NUMBER = 8
INDEX CONSTRAINT NUMBER = 9
INDEX CONSTRAINT NUMBER = 10
INDEX CONSTRAINT NUMBER = 6
INDEX CONSTRAINT NUMBER = 7
RVA =
0.33 0.33 0.33 0.33 0.33

NOTE THAT THE INDEX AT OPTIMUM
IS = 6 7 8 9 10

NOTE THAT NO COORDINATE CONSTRAINT
(#1-5) IS IN THE FINAL INDEX
THEREFORE NO RVA COMPONENT = 0.

IF GRADIENT = 0 THEN MULTIPLE
OPTIMUM EXISTS