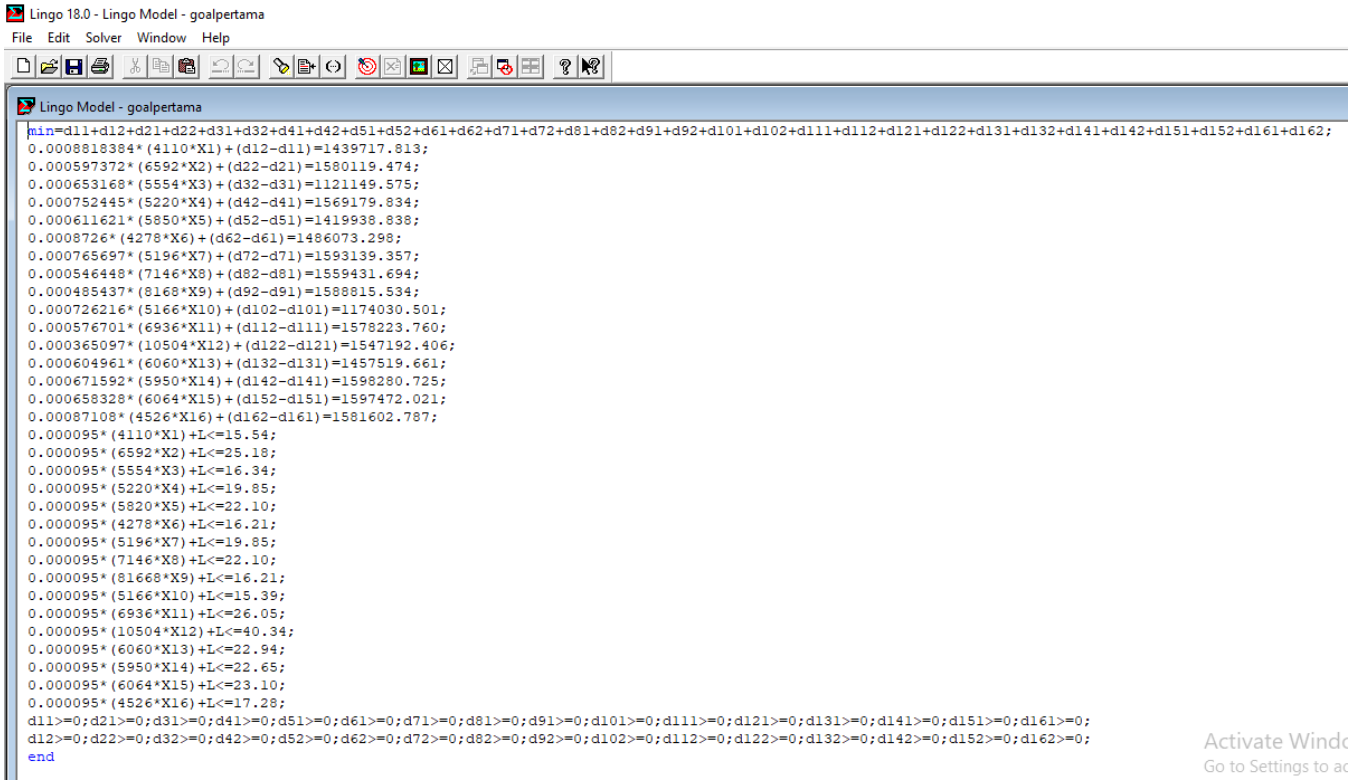
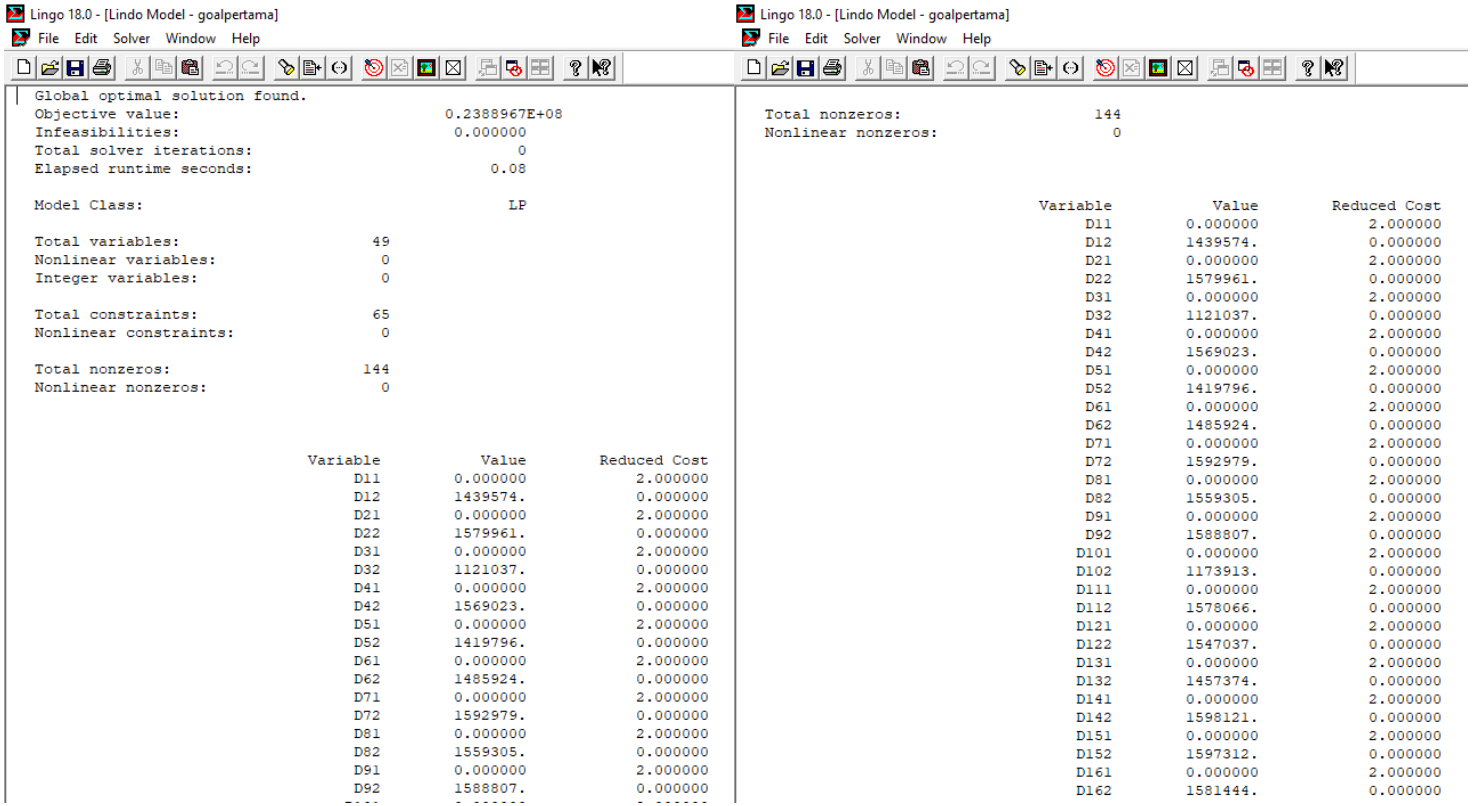
# LAMPIRAN

## Lampiran 1: Perhitungan *Fuzzy Goal Programming* Menggunakan Lingo 18.0




Lampiran 1. Skrip Perhitungan FGP Tujuan Pertama



Lingo 18.0 - [Lindo Model - goalpertama]

File Edit Solver Window Help

Global optimal solution found.

| | |
|---|---|
| Objective value: | 0.2388967E+08 |
| Infeasibilities: | 0.000000 |
| Total solver iterations: | 0 |
| Elapsed runtime seconds: | 0.08 |
| Model Class: | LP |
| Total variables: | 49 |
| Nonlinear variables: | 0 |
| Integer variables: | 0 |
| Total constraints: | 65 |
| Nonlinear constraints: | 0 |
| Total nonzeros: | 144 |
| Nonlinear nonzeros: | 0 |

| Variable | Value | Reduced Cost |
|---|---|---|
| D11 | 0.000000 | 2.000000 |
| D12 | 1439574. | 0.000000 |
| D21 | 0.000000 | 2.000000 |
| D22 | 1579961. | 0.000000 |
| D31 | 0.000000 | 2.000000 |
| D32 | 1121037. | 0.000000 |
| D41 | 0.000000 | 2.000000 |
| D42 | 1569023. | 0.000000 |
| D51 | 0.000000 | 2.000000 |
| D52 | 1419796. | 0.000000 |
| D61 | 0.000000 | 2.000000 |
| D62 | 1485924. | 0.000000 |
| D71 | 0.000000 | 2.000000 |
| D72 | 1592979. | 0.000000 |
| D81 | 0.000000 | 2.000000 |
| D82 | 1559305. | 0.000000 |
| D91 | 0.000000 | 2.000000 |
| D92 | 1588807. | 0.000000 |

Lingo 18.0 - [Lindo Model - goalpertama]

File Edit Solver Window Help

| | |
|---|---|
| Total nonzeros: | 144 |
| Nonlinear nonzeros: | 0 |

| Variable | Value | Reduced Cost |
|---|---|---|
| D11 | 0.000000 | 2.000000 |
| D12 | 1439574. | 0.000000 |
| D21 | 0.000000 | 2.000000 |
| D22 | 1579961. | 0.000000 |
| D31 | 0.000000 | 2.000000 |
| D32 | 1121037. | 0.000000 |
| D41 | 0.000000 | 2.000000 |
| D42 | 1569023. | 0.000000 |
| D51 | 0.000000 | 2.000000 |
| D52 | 1419796. | 0.000000 |
| D61 | 0.000000 | 2.000000 |
| D62 | 1485924. | 0.000000 |
| D71 | 0.000000 | 2.000000 |
| D72 | 1592979. | 0.000000 |
| D81 | 0.000000 | 2.000000 |
| D82 | 1559305. | 0.000000 |
| D91 | 0.000000 | 2.000000 |
| D92 | 1588807. | 0.000000 |
| D101 | 0.000000 | 2.000000 |
| D102 | 1173913. | 0.000000 |
| D111 | 0.000000 | 2.000000 |
| D112 | 1578066. | 0.000000 |
| D121 | 0.000000 | 2.000000 |
| D122 | 1547037. | 0.000000 |
| D131 | 0.000000 | 2.000000 |
| D132 | 1457374. | 0.000000 |
| D141 | 0.000000 | 2.000000 |
| D142 | 1598121. | 0.000000 |
| D151 | 0.000000 | 2.000000 |
| D152 | 1597312. | 0.000000 |
| D161 | 0.000000 | 2.000000 |
| D162 | 1581444. | 0.000000 |

Lampiran 2. Output Perhitungan FGP Tujuan Pertama

Lingo Model - SMKN2

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000564334*(1772*x1)+(d12-d11)=320000;
0.000564334*(1772*x2)+(d22-d21)=640000;
0.000564334*(1772*x3)+(d32-d31)=320000;
0.000546448*(1830*x4)+(d42-d41)=320000;
0.000546448*(1772*x1)+L<=30.98;
0.000546448*(1772*x2)+L<=61.97;
0.000546448*(1772*x3)+L<=30.98;
0.000546448*(1830*x4)+L<=32;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 3. Skrip Perhitungan FGP Tujuan Kedua SMKN 1

Lingo 18.0 - [SMKN1]

File Edit Solver Window Help

```
  Global optimal solution found.
  Objective value:                              1599858.
  Infeasibilities:                              0.000000
  Total solver iterations:                             0
  Elapsed runtime seconds:                          0.06

  Model Class:                                        LP

  Total variables:                    13
  Nonlinear variables:                 0
  Integer variables:                   0

  Total constraints:                  17
  Nonlinear constraints:               0

  Total nonzeros:                     36
  Nonlinear nonzeros:                  0


                      Variable           Value        Reduced Cost
                           D11        0.000000            2.000000
                           D12        319968.0            0.000000
                           D21        0.000000            2.000000
                           D22        639936.0            0.000000
                           D31        0.000000            2.000000
                           D32        319968.0            0.000000
                           D41        0.000000            2.000000
                           D42        319986.4            0.000000
                            X1        32.00003            0.000000
                            X2        64.00007            0.000000
                            X3        32.00003            0.000000
                            X4        13.60163            0.000000
                             L        0.000000            4.021907
```

Lampiran 4. Output Perhitungan FGP Tujuan Kedua SMKN 1

Lingo Model - SMKN2

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000564334*(1772*x1)+(d12-d11)=320000;
0.000564334*(1772*x2)+(d22-d21)=640000;
0.000564334*(1772*x3)+(d32-d31)=320000;
0.000546448*(1830*x4)+(d42-d41)=320000;
0.000546448*(1772*x1)+L<=30.98;
0.000546448*(1772*x2)+L<=61.97;
0.000546448*(1772*x3)+L<=30.98;
0.000546448*(1830*x4)+L<=32;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 5. Skrip Perhitungan FGP Tujuan Kedua SMKN 2

Lingo 18.0 - [SMKN2]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                    13
Nonlinear variables:                 0
Integer variables:                   0

Total constraints:                  17
Nonlinear constraints:               0

Total nonzeros:                     36
Nonlinear nonzeros:                  0
```

| Variable | Value | Reduced Cost |
|---|---|---|
| D11 | 0.000000 | 2.000000 |
| D12 | 319968.0 | 0.000000 |
| D21 | 0.000000 | 2.000000 |
| D22 | 639936.0 | 0.000000 |
| D31 | 0.000000 | 2.000000 |
| D32 | 319968.0 | 0.000000 |
| D41 | 0.000000 | 2.000000 |
| D42 | 319968.0 | 0.000000 |
| X1 | 31.99402 | 0.000000 |
| X2 | 63.99837 | 0.000000 |
| X3 | 31.99402 | 0.000000 |
| X4 | 32.00001 | 0.000000 |
| L | 0.000000 | 4.098194 |

Lampiran 6. Output Perhitungan FGP Tujuan Kedua SMKN 2

Lingo Model - SMKN3

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000485436*(2060*x1)+(d12-d11)=320000;
0.000485436*(2060*x2)+(d22-d21)=640000;
0.000485436*(2060*x3)+(d32-d31)=320000;
0.000503018*(1988*x4)+(d42-d41)=320000;
0.000485436*(2060*x1)+L<=32;
0.000485436*(2060*x2)+L<=64;
0.000485436*(2060*x3)+L<=32;
0.000485436*(2060*x4)+L<=30.88;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 7 . Skrip Perhitungan FGP Tujuan Kedua SMKN 3

Lingo 18.0 - [SMKN3]

File Edit Solver Window Help

```
  Global optimal solution found.
  Objective value:                              1599841.
  Infeasibilities:                              0.000000
  Total solver iterations:                             0
  Elapsed runtime seconds:                          0.06

  Model Class:                                        LP

  Total variables:                    13
  Nonlinear variables:                 0
  Integer variables:                   0

  Total constraints:                  17
  Nonlinear constraints:               0

  Total nonzeros:                     36
  Nonlinear nonzeros:                  0


                      Variable           Value        Reduced Cost
                           D11        0.000000            2.000000
                           D12        319968.0            0.000000
                           D21        0.000000            2.000000
                           D22        639936.0            0.000000
                           D31        0.000000            2.000000
                           D32        319968.0            0.000000
                           D41        0.000000            2.000000
                           D42        319969.1            0.000000
                            X1        32.00006            0.000000
                            X2        64.00012            0.000000
                            X3        32.00006            0.000000
                            X4        30.88006            0.000000
                             L        0.000000            4.000002
```

Lampiran 8. Output Perhitungan FGP Tujuan Kedua SMKN 3

Lingo Model - SMKN4

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000791765*(1263*x1)+(d12-d11)=320000;
0.000791765*(1263*x2)+(d22-d21)=640000;
0.000791765*(1263*x3)+(d32-d31)=320000;
0.000726216*(1377*x4)+(d42-d41)=320000;
0.000726216*(1263*x1)+L<=32;
0.000726216*(1263*x2)+L<=64;
0.000726216*(1263*x3)+L<=32;
0.000726216*(1377*x4)+L<=0;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 9. Skrip Perhitungan FGP Tujuan Kedua SMKN 4

Lingo 18.0 - [SMKN4]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599860.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.08

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0


                     Variable           Value        Reduced Cost
                          D11        0.000000            2.000000
                          D12        319965.1            0.000000
                          D21        0.000000            2.000000
                          D22        639930.2            0.000000
                          D31        0.000000            2.000000
                          D32        319965.1            0.000000
                          D41        0.000000            2.000000
                          D42        320000.0            0.000000
                           X1        34.88838            0.000000
                           X2        69.77676            0.000000
                           X3        34.88838            0.000000
                           X4        0.000000            0.000000
                            L        0.000000            4.270783
```

Lampiran 10. Output Perhitungan FGP Tujuan Kedua SMKN 4

Lingo Model - SMKN5

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000576701*(1734*x1)+(d12-d11)=320000;
0.000576701*(1734*x2)+(d22-d21)=640000;
0.000576701*(1734*x3)+(d32-d31)=320000;
0.000618811*(1616*x4)+(d42-d41)=320000;
0.000576701*(1734*x1)+L<=32;
0.000576701*(1734*x2)+L<=64;
0.000576701*(1734*x3)+L<=32;
0.000576701*(1616*x4)+L<=29.82;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 11. Skrip Perhitungan FGP Tujuan Kedua SMKN 5

Lingo 18.0 - [SMKN5]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0


                     Variable           Value        Reduced Cost
                          D11        0.000000            2.000000
                          D12        319968.0            0.000000
                          D21        0.000000            2.000000
                          D22        639936.0            0.000000
                          D31        0.000000            2.000000
                          D32        319968.0            0.000000
                          D41        0.000000            2.000000
                          D42        319968.0            0.000000
                           X1        32.00001            0.000000
                           X2        64.00003            0.000000
                           X3        32.00001            0.000000
                           X4        31.99747            0.000000
                            L        0.000000            4.073019
```

Lampiran 12. Output Perhitungan FGP Tujuan Kedua SMKN 5

Lingo Model - SMKN6

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000365096*(2739*x1)+(d12-d11)=320000;
0.000365096*(2739*x2)+(d22-d21)=640000;
0.000365096*(2739*x3)+(d32-d31)=320000;
0.000437254*(2287*x4)+(d42-d41)=320000;
0.000365096*(2739*x1)+L<=32;
0.000365096*(2739*x2)+L<=64;
0.000365096*(2739*x3)+L<=32;
0.000365096*(2287*x4)+L<=26.72;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 13. Skrip Perhitungan FGP Tujuan Kedua SMKN 6

Lingo 18.0 - [SMKN6]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0
```

| Variable | Value | Reduced Cost |
|---|---|---|
| D11 | 0.000000 | 2.000000 |
| D12 | 319968.0 | 0.000000 |
| D21 | 0.000000 | 2.000000 |
| D22 | 639936.0 | 0.000000 |
| D31 | 0.000000 | 2.000000 |
| D32 | 319968.0 | 0.000000 |
| D41 | 0.000000 | 2.000000 |
| D42 | 319968.0 | 0.000000 |
| X1 | 32.00007 | 0.000000 |
| X2 | 64.00013 | 0.000000 |
| X3 | 32.00007 | 0.000000 |
| X4 | 32.00098 | 0.000000 |
| L | 0.000000 | 4.197641 |

Lampiran 14. Output Perhitungan FGP Tujuan Kedua SMKN 6

Lingo Model - SMKN7

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000680735*(1469*x1)+(d12-d11)=320000;
0.000680735*(1469*x2)+(d22-d21)=640000;
0.000680735*(1469*x3)+(d32-d31)=320000;
0.000604960*(1653*x4)+(d42-d41)=320000;
0.000604960*(1469*x1)+L<=28.44;
0.000604960*(1469*x2)+L<=58.87;
0.000604960*(1469*x3)+L<=28.87;
0.000604960*(1653*x4)+L<=32;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 15. Skrip Perhitungan FGP Tujuan Kedua SMKN 7

Lingo 18.0 - [SMKN7]

File Edit Solver Window Help

```
  Global optimal solution found.
  Objective value:                              1599837.
  Infeasibilities:                              0.000000
  Total solver iterations:                             0
  Elapsed runtime seconds:                          0.06

  Model Class:                                        LP

  Total variables:                    13
  Nonlinear variables:                 0
  Integer variables:                   0

  Total constraints:                  17
  Nonlinear constraints:               0

  Total nonzeros:                     36
  Nonlinear nonzeros:                  0


                      Variable           Value        Reduced Cost
                           D11        0.000000            2.000000
                           D12        319968.0            0.000000
                           D21        0.000000            2.000000
                           D22        639933.8            0.000000
                           D31        0.000000            2.000000
                           D32        319967.5            0.000000
                           D41        0.000000            2.000000
                           D42        319968.0            0.000000
                            X1        32.00230            0.000000
                            X2        66.24385            0.000000
                            X3        32.48616            0.000000
                            X4        32.00004            0.000000
                             L        0.000000            4.375769
```

Lampiran 16. Output Perhitungan FGP Tujuan Kedua SMKN 7

Lingo Model - SMKN8

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000672494*(1487*x1)+(d12-d11)=320000;
0.000672494*(1487*x2)+(d22-d21)=640000;
0.000672494*(1487*x3)+(d32-d31)=320000;
0.000671591*(1489*x4)+(d42-d41)=320000;
0.000671591*(1487*x1)+L<=31.96;
0.000671591*(1487*x2)+L<=63.91;
0.000671591*(1487*x3)+L<=31.96;
0.000671591*(1489*x4)+L<=32;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 17. Skrip Perhitungan FGP Tujuan Kedua SMKN 8

Lingo 18.0 - [SMKN8]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0


                     Variable           Value        Reduced Cost
                          D11        0.000000            2.000000
                          D12        319968.0            0.000000
                          D21        0.000000            2.000000
                          D22        639936.0            0.000000
                          D31        0.000000            2.000000
                          D32        319968.0            0.000000
                          D41        0.000000            2.000000
                          D42        319968.0            0.000000
                           X1        32.00302            0.000000
                           X2        63.99602            0.000000
                           X3        32.00302            0.000000
                           X4        32.00003            0.000000
                            L        0.000000            4.004034
```

Lampiran 18. Output Perhitungan FGP Tujuan Kedua SMKN 8

Lingo Model - SMKN9

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000658327*(1519*x1)+(d12-d11)=320000;
0.000658327*(1519*x2)+(d22-d21)=640000;
0.000658327*(1519*x3)+(d32-d31)=320000;
0.000663570*(1507*x4)+(d42-d41)=320000;
0.000658327*(1519*x1)+L<=32;
0.000658327*(1519*x2)+L<=64;
0.000658327*(1519*x3)+L<=32;
0.000658327*(1507*x4)+L<=31.75;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 19. Skrip Perhitungan FGP Tujuan Kedua SMKN 9

Lingo 18.0 - [SMKN9]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.05

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0


                     Variable           Value        Reduced Cost
                          D11        0.000000            2.000000
                          D12        319968.0            0.000000
                          D21        0.000000            2.000000
                          D22        639936.0            0.000000
                          D31        0.000000            2.000000
                          D32        319968.0            0.000000
                          D41        0.000000            2.000000
                          D42        319968.0            0.000000
                           X1        32.00004            0.000000
                           X2        64.00008            0.000000
                           X3        32.00004            0.000000
                           X4        32.00286            0.000000
                            L        0.000000            4.007964
```

Lampiran 20. Output Perhitungan FGP Tujuan Kedua SMKN 9

Lingo Model - SMKN10

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.001008064*(992*x1)+(d12-d11)=320000;
0.001008064*(992*x2)+(d22-d21)=640000;
0.001008064*(992*x3)+(d32-d31)=320000;
0.000881834*(1134*x4)+(d42-d41)=320000;
0.000881834*(992*x1)+L<=2798.9417;
0.000881834*(992*x2)+L<=559859.9065;
0.000881834*(992*x3)+L<=2798.9417;
0.000881834*(1134*x4)+L<=320000;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 21. Skrip Perhitungan FGP Tujuan Kedua SMKN 10

Lingo 18.0 - [SMKN10]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              633600.8
Infeasibilities:                              0.000000
Total solver iterations:                             1
Elapsed runtime seconds:                          0.11

Model Class:                                        LP

Total variables:                 13
Nonlinear variables:              0
Integer variables:                0

Total constraints:               17
Nonlinear constraints:            0

Total nonzeros:                  36
Nonlinear nonzeros:               0
```

| Variable | Value | Reduced Cost |
|---|---|---|
| D11 | 0.000000 | 2.000000 |
| D12 | 316800.4 | 0.000000 |
| D21 | 0.000000 | 1.000000 |
| D22 | 0.000000 | 1.000000 |
| D31 | 0.000000 | 2.000000 |
| D32 | 316800.4 | 0.000000 |
| D41 | 0.000000 | 2.000000 |
| D42 | 0.000000 | 0.000000 |
| X1 | 3199.597 | 0.000000 |
| X2 | 640000.3 | 0.000000 |
| X3 | 3199.597 | 0.000000 |
| X4 | 320000.1 | 0.000000 |
| L | 0.000000 | 3.286290 |

Lampiran 22. Output Perhitungan FGP Tujuan Kedua SMKN 10

Lingo Model - SMKN11

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000597371*(1674*x1)+(d12-d11)=320000;
0.000597371*(1674*x2)+(d22-d21)=640000;
0.000597371*(1674*x3)+(d32-d31)=320000;
0.000881834*(1570*x4)+(d42-d41)=320000;
0.000597371*(1674*x1)+L<=32;
0.000597371*(1674*x2)+L<=64;
0.000597371*(1674*x3)+L<=32;
0.000597371*(1570*x4)+L<=30.02;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 23. Skrip Perhitungan FGP Tujuan Kedua SMKN 11

Lingo 18.0 - [SMKN11]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599828.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                     13
Nonlinear variables:                  0
Integer variables:                    0

Total constraints:                   17
Nonlinear constraints:                0

Total nonzeros:                      36
Nonlinear nonzeros:                   0

                     Variable           Value        Reduced Cost
                          D11        0.000000            2.000000
                          D12        319968.0            0.000000
                          D21        0.000000            2.000000
                          D22        639936.0            0.000000
                          D31        0.000000            2.000000
                          D32        319968.0            0.000000
                          D41        0.000000            2.000000
                          D42        319955.7            0.000000
                           X1        32.00003            0.000000
                           X2        64.00006            0.000000
                           X3        32.00003            0.000000
                           X4        32.00862            0.000000
                            L        0.000000            4.476192
```

Lampiran 24. Output Perhitungan FGP Tujuan Kedua SMKN 11

Lingo Model - SMKN12

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000745712*(1341*x1)+(d12-d11)=320000;
0.000745712*(1341*x2)+(d22-d21)=640000;
0.000745712*(1341*x3)+(d32-d31)=320000;
0.000653167*(1531*x4)+(d42-d41)=320000;
0.000653167*(1341*x1)+L<=28.03;
0.000653167*(1341*x2)+L<=56.06;
0.000653167*(1341*x3)+L<=28.03;
0.000653167*(1531*x4)+L<=0;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 25. Skrip Perhitungan FGP Tujuan Kedua SMKN 12

Lingo 18.0 - [SMKN12]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599872.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.05

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0


                     Variable           Value        Reduced Cost
                          D11        0.000000            2.000000
                          D12        319968.0            0.000000
                          D21        0.000000            2.000000
                          D22        639936.0            0.000000
                          D31        0.000000            2.000000
                          D32        319968.0            0.000000
                          D41        0.000000            2.000000
                          D42        320000.0            0.000000
                           X1        32.00148            0.000000
                           X2        64.00296            0.000000
                           X3        32.00148            0.000000
                           X4        0.000000            0.000000
                            L        0.000000            4.425060
```

Lampiran 26. Output Perhitungan FGP Tujuan Kedua SMKN 12

Lingo Model - SMKN13

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000771010*(1297*x1)+(d12-d11)=320000;
0.000771010*(1297*x2)+(d22-d21)=640000;
0.000771010*(1297*x3)+(d32-d31)=320000;
0.000752445*(1329*x4)+(d42-d41)=320000;
0.000752445*(1297*x1)+L<=31.23;
0.000752445*(1297*x2)+L<=62.46;
0.000752445*(1297*x3)+L<=31.23;
0.000752445*(1329*x4)+L<=32;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 27. Skrip Perhitungan FGP Tujuan Kedua SMKN 13

Lingo 18.0 - [SMKN13]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0
```

| Variable | Value | Reduced Cost |
|---|---|---|
| D11 | 0.000000 | 2.000000 |
| D12 | 319968.0 | 0.000000 |
| D21 | 0.000000 | 2.000000 |
| D22 | 639936.0 | 0.000000 |
| D31 | 0.000000 | 2.000000 |
| D32 | 319968.0 | 0.000000 |
| D41 | 0.000000 | 2.000000 |
| D42 | 319968.0 | 0.000000 |
| X1 | 32.00054 | 0.000000 |
| X2 | 64.00107 | 0.000000 |
| X3 | 32.00054 | 0.000000 |
| X4 | 32.00002 | 0.000000 |
| L | 0.000000 | 4.074019 |

Lampiran 28. Output Perhitungan FGP Tujuan Kedua SMKN 13

Lingo Model - SMKN14

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000711743*(1405*x1)+(d12-d11)=320000;
0.000711743*(1405*x2)+(d22-d21)=640000;
0.000711743*(1405*x3)+(d32-d31)=320000;
0.000611621*(1635*x4)+(d42-d41)=320000;
0.000711743*(1405*x1)+L<=27.51;
0.000711743*(1405*x2)+L<=54.99;
0.000711743*(1405*x3)+L<=27.51;
0.000711743*(1635*x4)+L<=32;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 29. Skrip Perhitungan FGP Tujuan Kedua SMKN 14

Lingo 18.0 - [SMKN14]

File Edit Solver Window Help

```
  Global optimal solution found.
  Objective value:                              1599862.
  Infeasibilities:                              0.000000
  Total solver iterations:                             0
  Elapsed runtime seconds:                          0.06

  Model Class:                                        LP

  Total variables:                    13
  Nonlinear variables:                 0
  Integer variables:                   0

  Total constraints:                  17
  Nonlinear constraints:               0

  Total nonzeros:                     36
  Nonlinear nonzeros:                  0


                      Variable           Value        Reduced Cost
                           D11        0.000000            2.000000
                           D12        319972.5            0.000000
                           D21        0.000000            2.000000
                           D22        639945.0            0.000000
                           D31        0.000000            2.000000
                           D32        319972.5            0.000000
                           D41        0.000000            2.000000
                           D42        319972.5            0.000000
                            X1        27.51003            0.000000
                            X2        54.99006            0.000000
                            X3        27.51003            0.000000
                            X4        27.49850            0.000000
                             L        0.000000            3.859328
```

Lampiran 30. Output Perhitungan FGP Tujuan Kedua SMKN 14

Lingo Model - SMKN15

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000957854*(1044*x1)+(d12-d11)=320000;
0.000957854*(1044*x2)+(d22-d21)=640000;
0.000957854*(1044*x3)+(d32-d31)=320000;
0.000872600*(1146*x4)+(d42-d41)=320000;
0.000872600*(1044*x1)+L<=29.15;
0.000872600*(1044*x2)+L<=58.30;
0.000872600*(1044*x3)+L<=29.15;
0.000872600*(1146*x4)+L<=32;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 31. Skrip Perhitungan FGP Tujuan Kedua SMKN 15

Lingo 18.0 - [SMKN15]

File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                   13
Nonlinear variables:                0
Integer variables:                  0

Total constraints:                 17
Nonlinear constraints:              0

Total nonzeros:                    36
Nonlinear nonzeros:                 0


                     Variable           Value        Reduced Cost
                          D11        0.000000            2.000000
                          D12        319968.0            0.000000
                          D21        0.000000            2.000000
                          D22        639936.0            0.000000
                          D31        0.000000            2.000000
                          D32        319968.0            0.000000
                          D41        0.000000            2.000000
                          D42        319968.0            0.000000
                           X1        31.99800            0.000000
                           X2        63.99600            0.000000
                           X3        31.99800            0.000000
                           X4        32.00001            0.000000
                            L        0.000000            4.293103
```

Lampiran 32. Output Perhitungan FGP Tujuan Kedua SMKN 15

Lingo Model - SMKN PU

```
min=d11+d12+d21+d22+d31+d32+d41+d42;
0.000871080*(1148*x1)+(d12-d11)=320000;
0.000871080*(1148*x2)+(d22-d21)=640000;
0.000871080*(1148*x3)+(d32-d31)=320000;
0.000924214*(1082*x4)+(d42-d41)=320000;
0.000871080*(1148*x1)+L<=32;
0.000871080*(1148*x2)+L<=64;
0.000871080*(1148*x3)+L<=32;
0.000871080*(1082*x4)+L<=30.16;
d11>=0;d21>=0;d31>=0;d41>=0;
d12>=0;d22>=0;d32>=0;d42>=0;
end
```

Lampiran 33. Skrip Perhitungan FGP Tujuan Kedua SMKN PU

Lingo 18.0 - [SMKN PU]

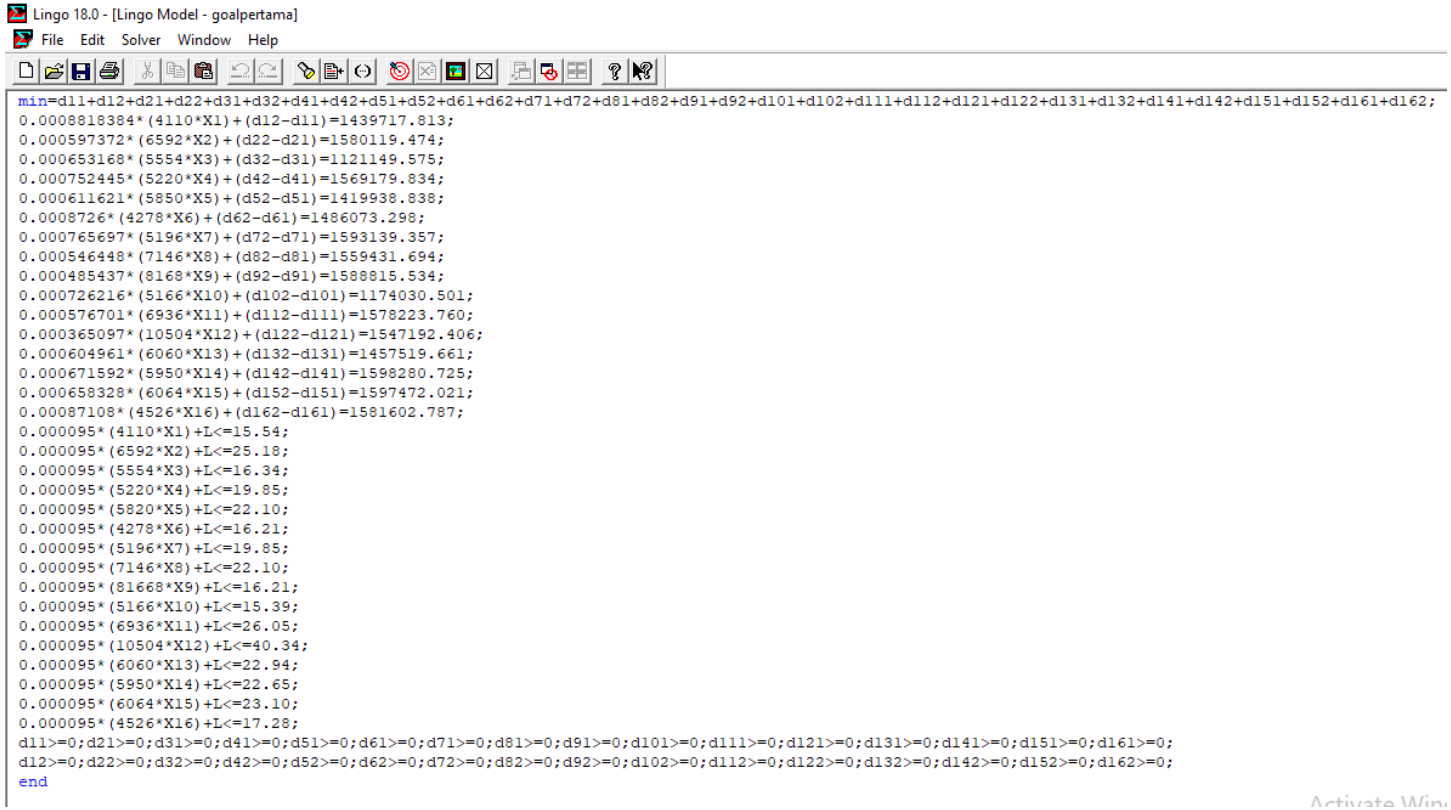
File Edit Solver Window Help

```
Global optimal solution found.
Objective value:                              1599840.
Infeasibilities:                              0.000000
Total solver iterations:                             0
Elapsed runtime seconds:                          0.06

Model Class:                                        LP

Total variables:                    13
Nonlinear variables:                 0
Integer variables:                   0

Total constraints:                  17
Nonlinear constraints:               0

Total nonzeros:                     36
Nonlinear nonzeros:                  0
```

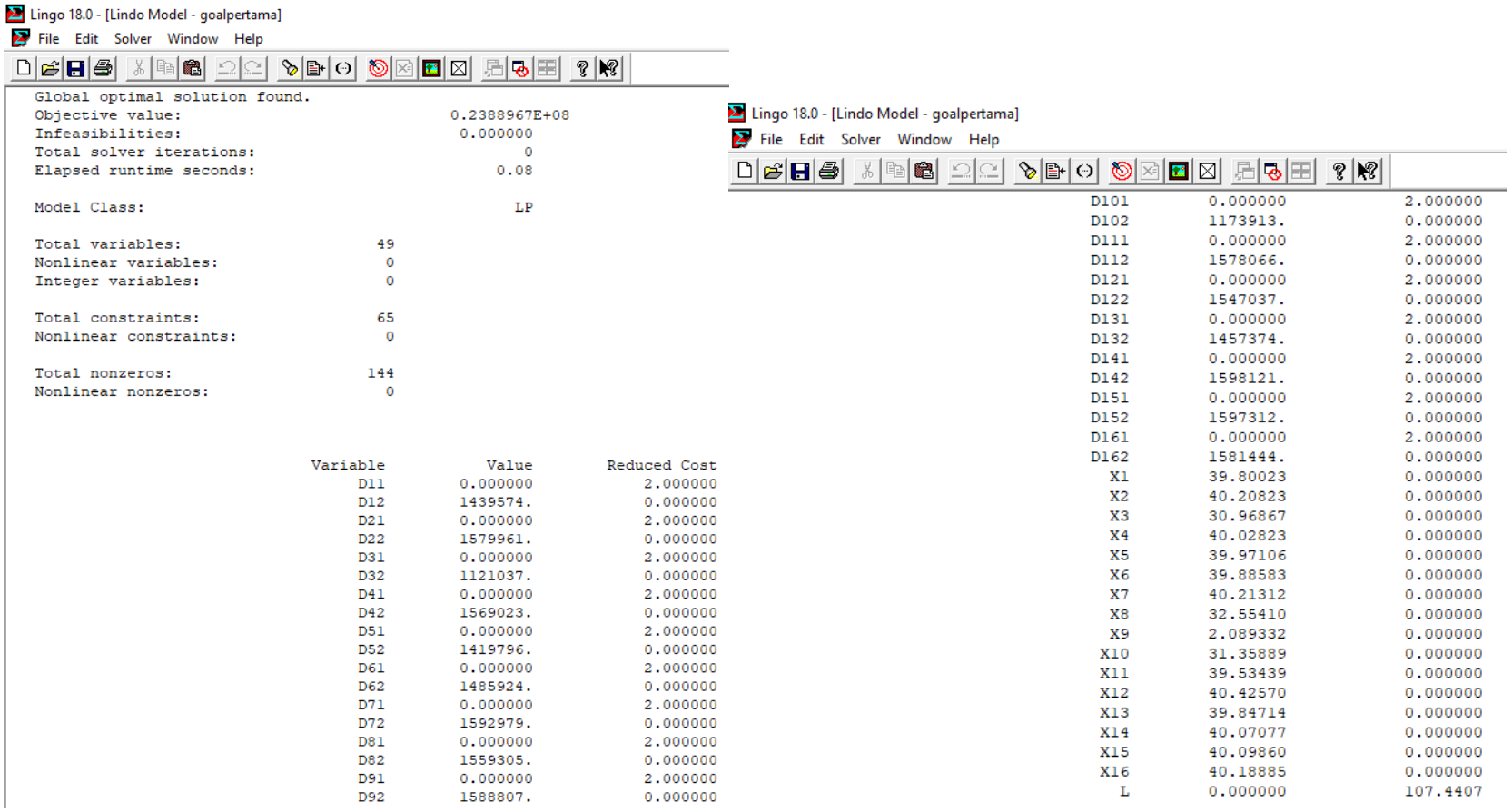
| Variable | Value | Reduced Cost |
|---|---|---|
| D11 | 0.000000 | 2.000000 |
| D12 | 319968.0 | 0.000000 |
| D21 | 0.000000 | 2.000000 |
| D22 | 639936.0 | 0.000000 |
| D31 | 0.000000 | 2.000000 |
| D32 | 319968.0 | 0.000000 |
| D41 | 0.000000 | 2.000000 |
| D42 | 319968.0 | 0.000000 |
| X1 | 32.00001 | 0.000000 |
| X2 | 64.00001 | 0.000000 |
| X3 | 32.00001 | 0.000000 |
| X4 | 31.99971 | 0.000000 |
| L | 0.000000 | 4.060998 |

Lampiran 34. Output Perhitungan FGP Tujuan Kedua SMKN PU

## Lampiran 2: Perhitungan *Goal Programming* Menggunakan Lingo 18.0




Lampiran 35. Skrip Perhitungan GP Tujuan Pertama



Lingo 18.0 - [Lindo Model - goalpertama]

File Edit Solver Window Help

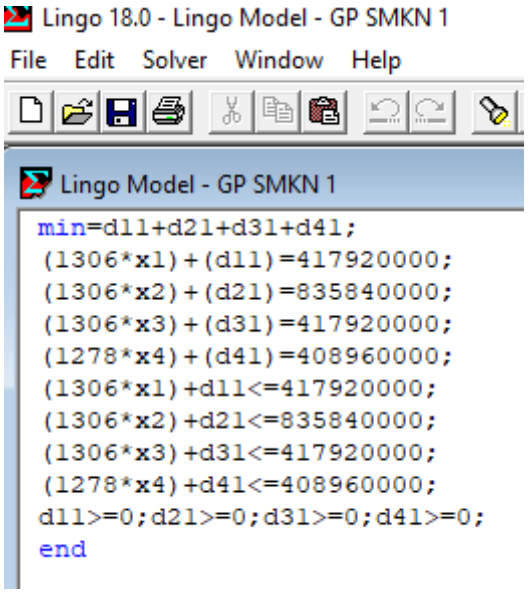
```
  Global optimal solution found.
  Objective value:                              0.2388967E+08
  Infeasibilities:                              0.000000
  Total solver iterations:                             0
  Elapsed runtime seconds:                          0.08

  Model Class:                                        LP

  Total variables:                    49
  Nonlinear variables:                 0
  Integer variables:                   0

  Total constraints:                  65
  Nonlinear constraints:               0

  Total nonzeros:                    144
  Nonlinear nonzeros:                  0


                      Variable           Value        Reduced Cost
                           D11        0.000000            2.000000
                           D12        1439574.            0.000000
                           D21        0.000000            2.000000
                           D22        1579961.            0.000000
                           D31        0.000000            2.000000
                           D32        1121037.            0.000000
                           D41        0.000000            2.000000
                           D42        1569023.            0.000000
                           D51        0.000000            2.000000
                           D52        1419796.            0.000000
                           D61        0.000000            2.000000
                           D62        1485924.            0.000000
                           D71        0.000000            2.000000
                           D72        1592979.            0.000000
                           D81        0.000000            2.000000
                           D82        1559305.            0.000000
                           D91        0.000000            2.000000
                           D92        1588807.            0.000000
```

Lingo 18.0 - [Lindo Model - goalpertama]

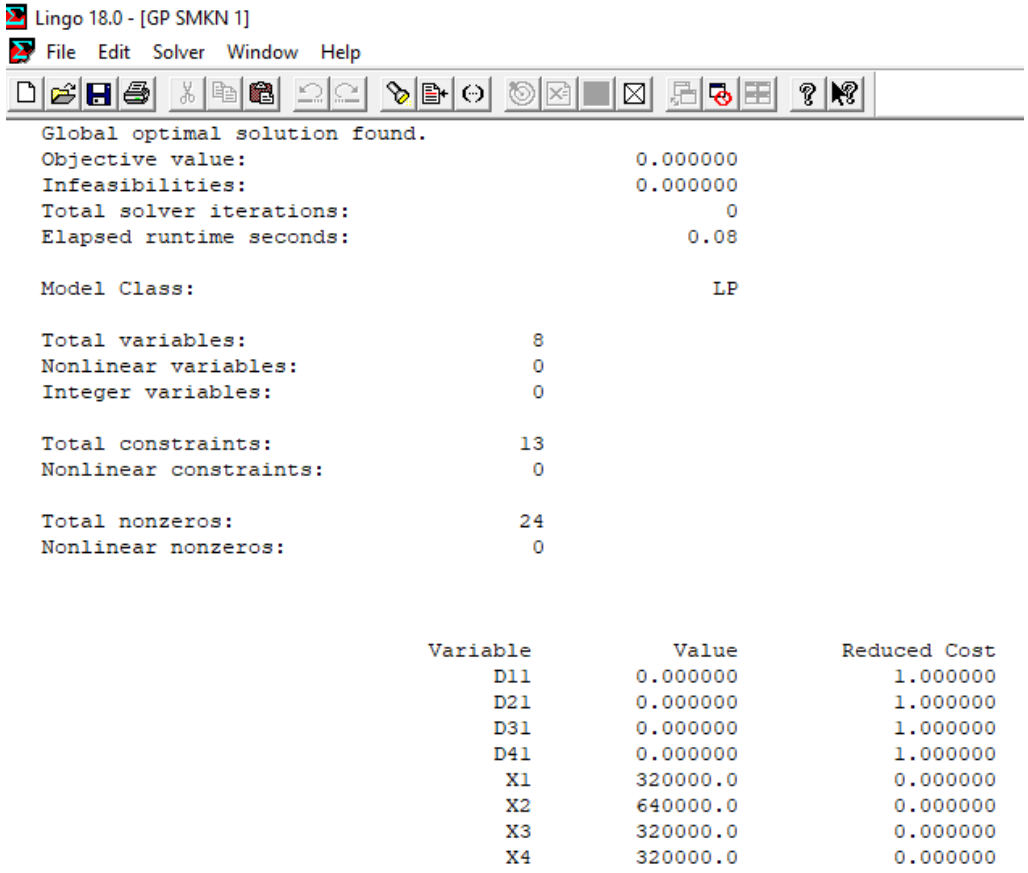
File Edit Solver Window Help

```
                          D101        0.000000            2.000000
                          D102        1173913.            0.000000
                          D111        0.000000            2.000000
                          D112        1578066.            0.000000
                          D121        0.000000            2.000000
                          D122        1547037.            0.000000
                          D131        0.000000            2.000000
                          D132        1457374.            0.000000
                          D141        0.000000            2.000000
                          D142        1598121.            0.000000
                          D151        0.000000            2.000000
                          D152        1597312.            0.000000
                          D161        0.000000            2.000000
                          D162        1581444.            0.000000
                            X1        39.80023            0.000000
                            X2        40.20823            0.000000
                            X3        30.96867            0.000000
                            X4        40.02823            0.000000
                            X5        39.97106            0.000000
                            X6        39.88583            0.000000
                            X7        40.21312            0.000000
                            X8        32.55410            0.000000
                            X9        2.089332            0.000000
                           X10        31.35889            0.000000
                           X11        39.53439            0.000000
                           X12        40.42570            0.000000
                           X13        39.84714            0.000000
                           X14        40.07077            0.000000
                           X15        40.09860            0.000000
                           X16        40.18885            0.000000
                             L        0.000000            107.4407
```

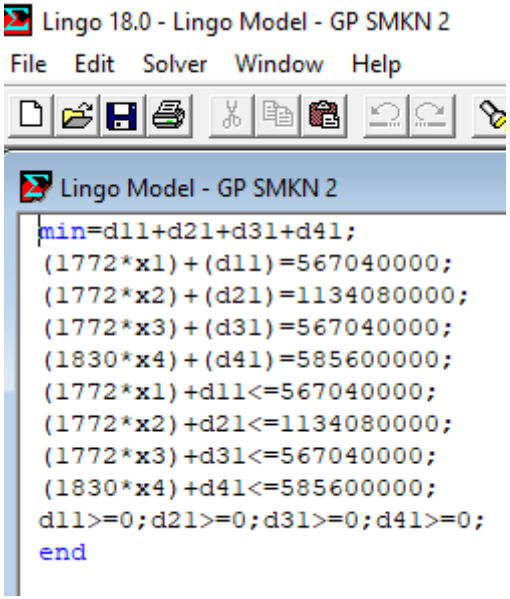
Lampiran 36. Output Perhitungan GP Tujuan Pertama



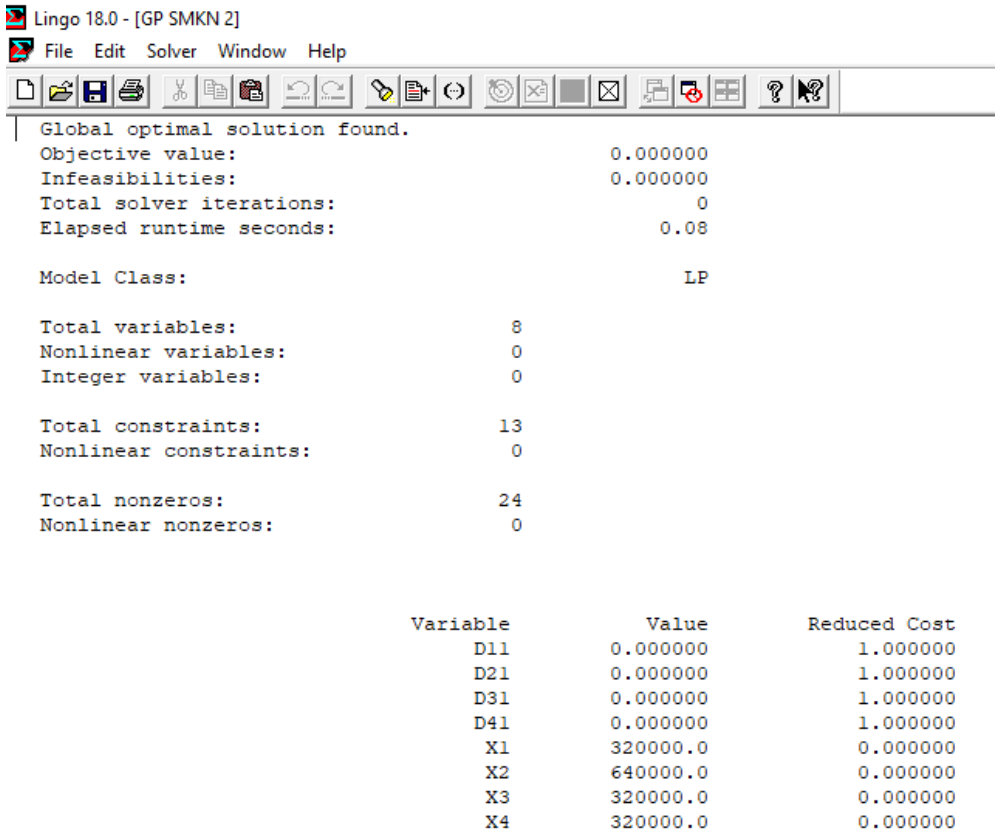

Lampiran 37. Skrip Perhitungan GP Tujuan Kedua SMKN 1



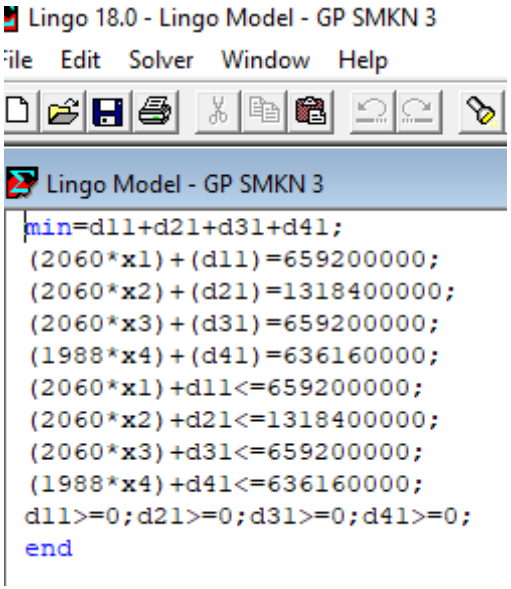

Lampiran 38. Output Perhitungan GP Tujuan Kedua SMKN 1



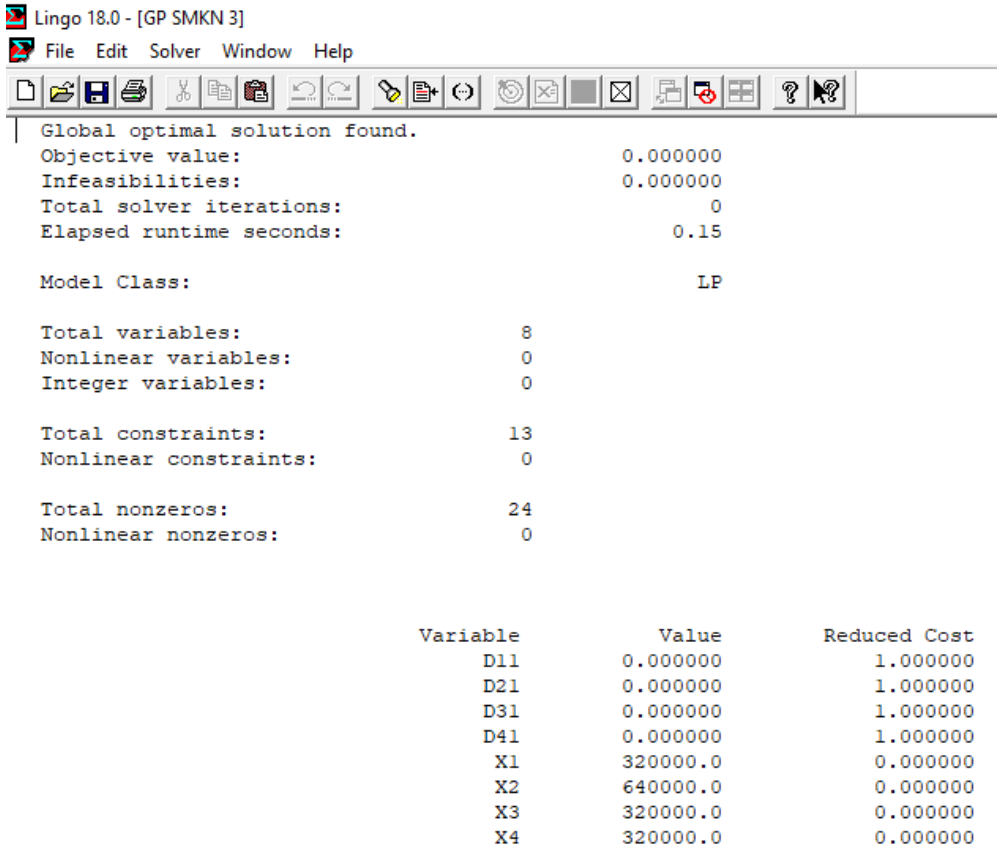

Lampiran 39. Skrip Perhitungan GP Tujuan Kedua SMKN 2



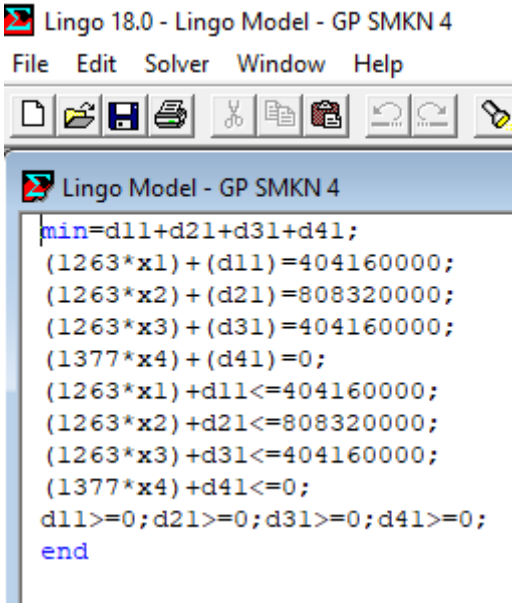

Lampiran 40. Output Perhitungan GP Tujuan Kedua SMKN 2



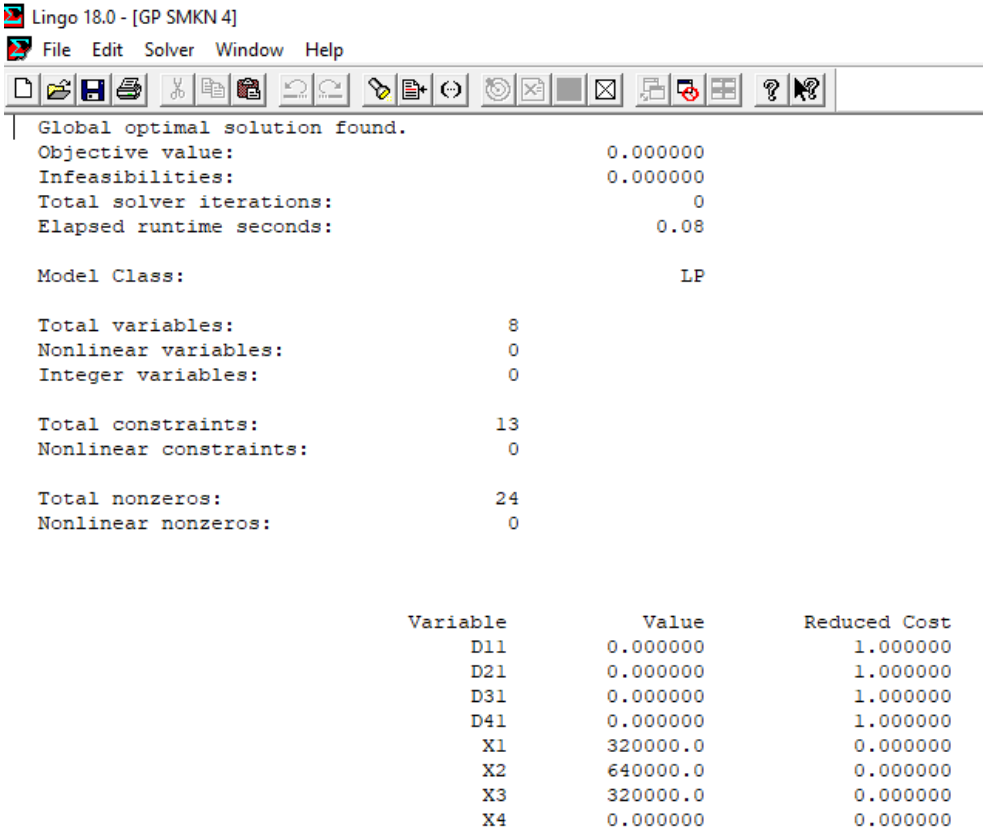

Lampiran 41. Skrip Perhitungan GP Tujuan Kedua SMKN 3



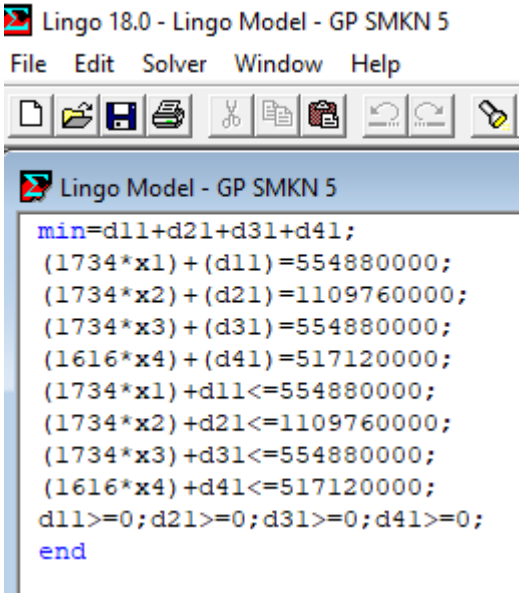

Lampiran 42. Output Perhitungan GP Tujuan Kedua SMKN 3



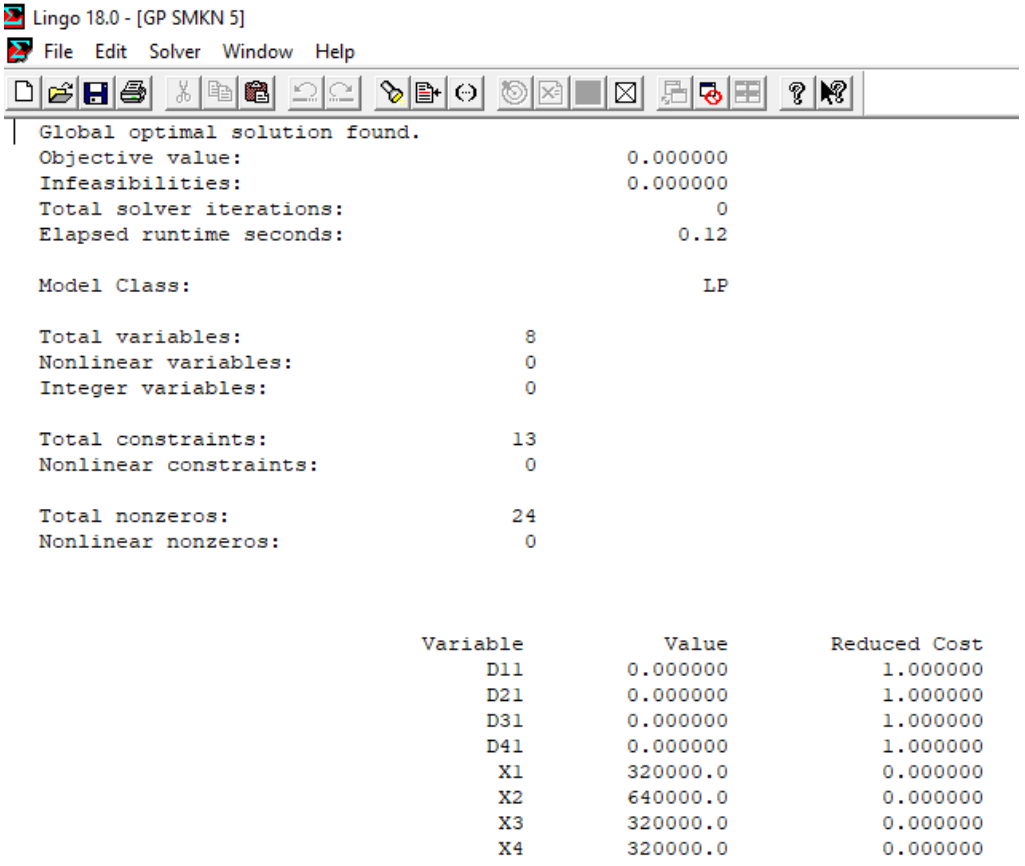

Lampiran 43. Skrip Perhitungan GP Tujuan Kedua SMKN 4



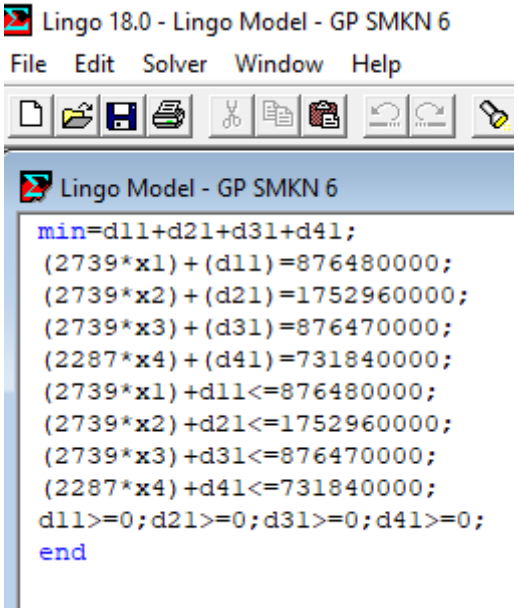

Lampiran 44. Output Perhitungan GP Tujuan Kedua SMKN 4



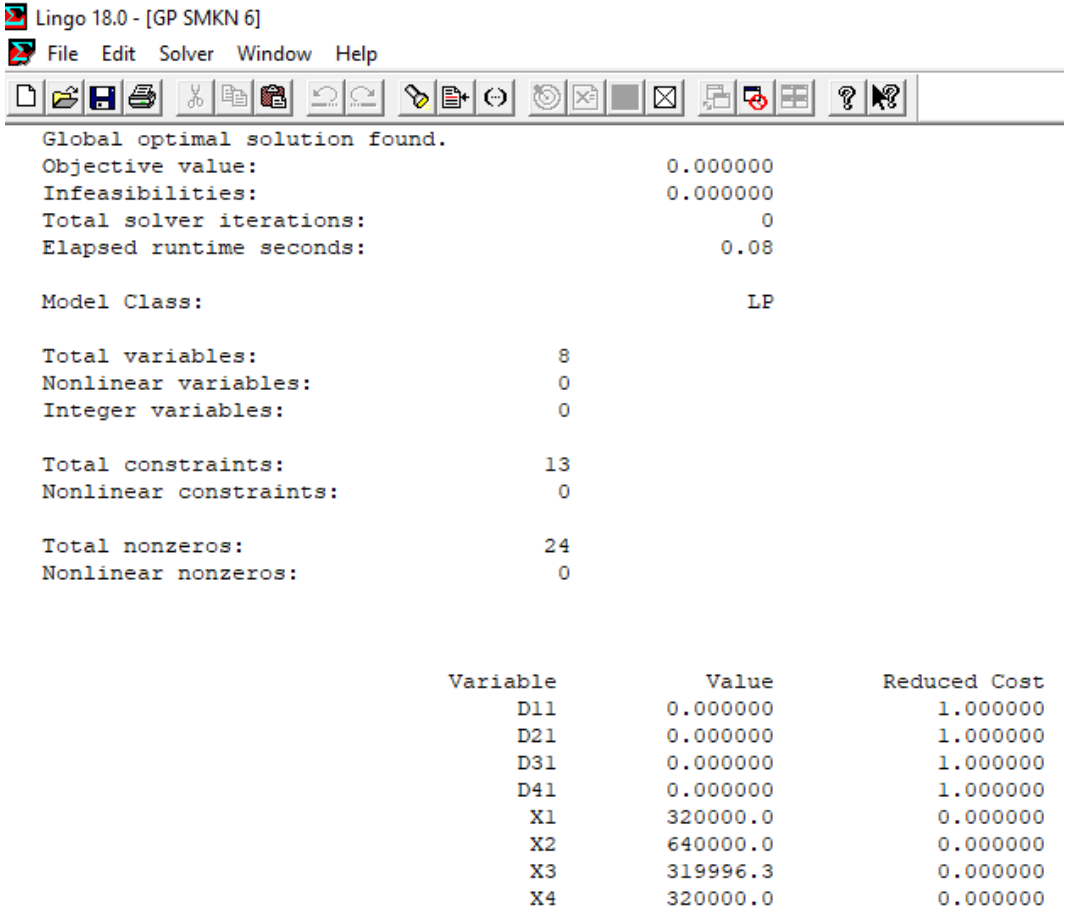

Lampiran 45. Skrip Perhitungan GP Tujuan Kedua SMKN 5



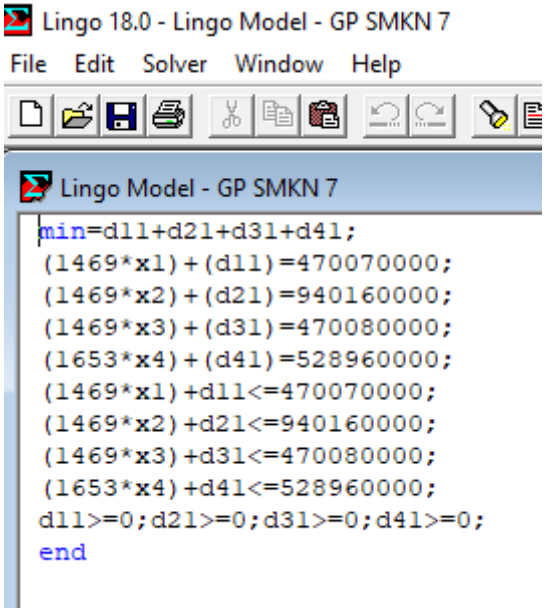

Lampiran 46. Output Perhitungan GP Tujuan Kedua SMKN 5



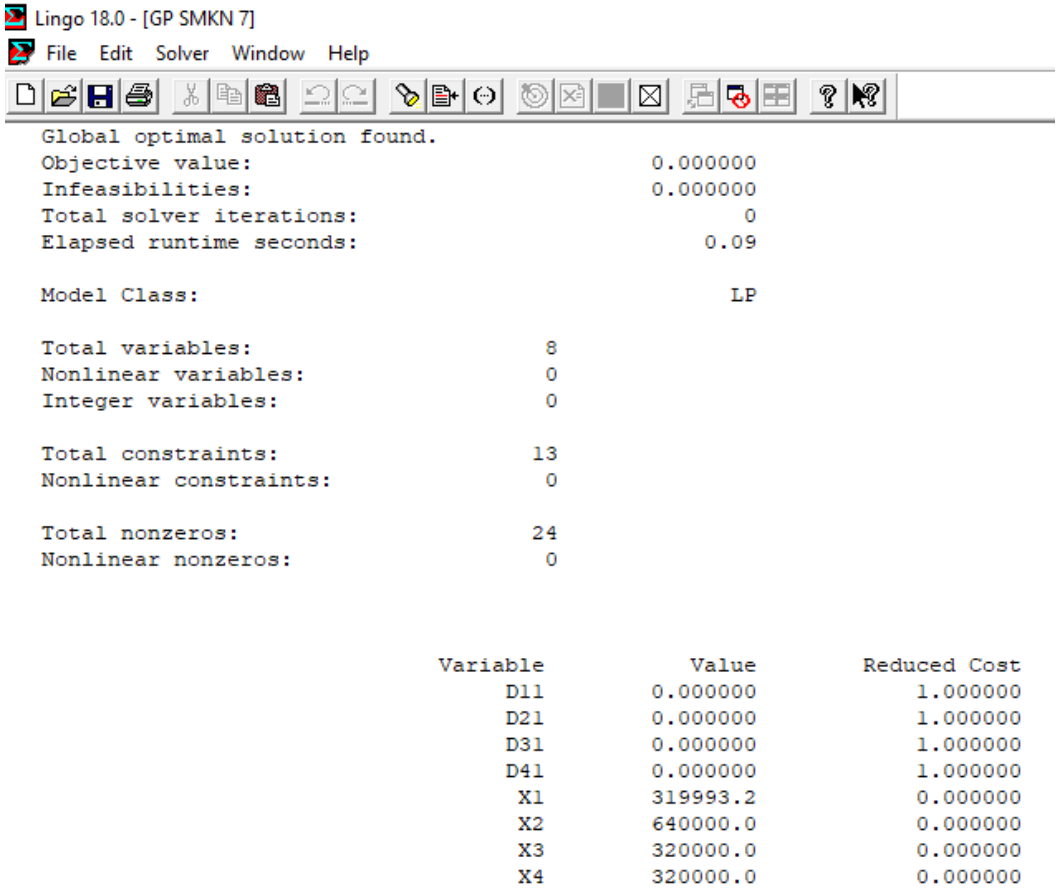

Lampiran 47. Skrip Perhitungan GP Tujuan Kedua SMKN 6



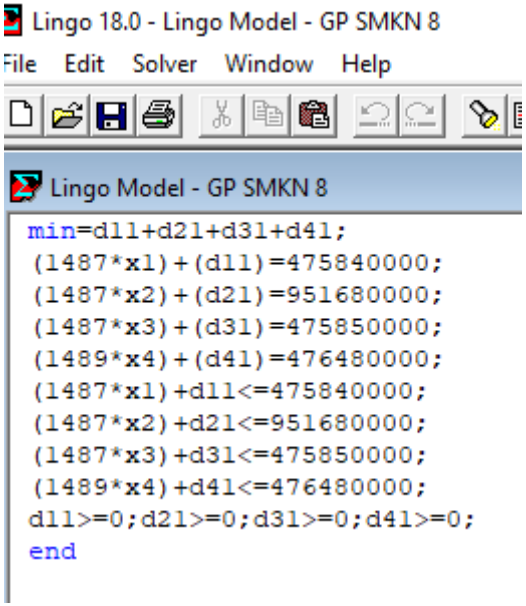

Lampiran 48. Output Perhitungan GP Tujuan Kedua SMKN 6



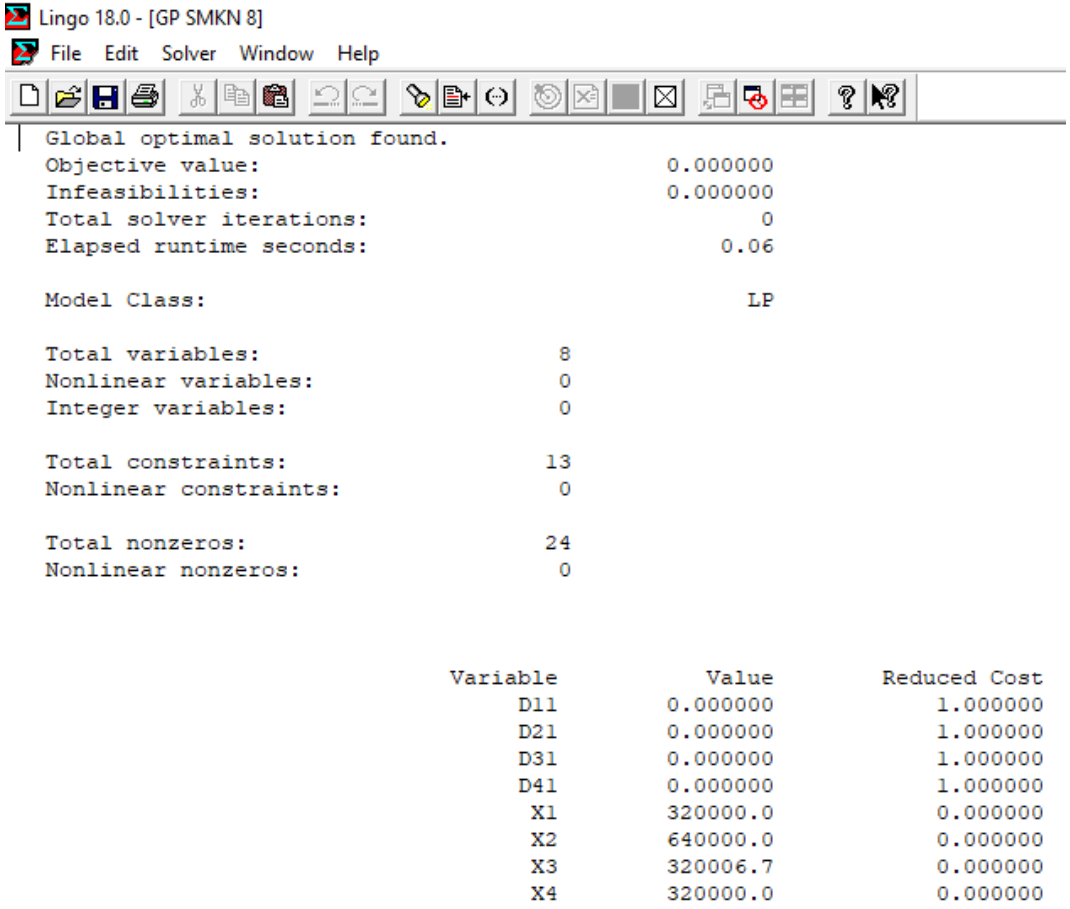

Lampiran 49. Skrip Perhitungan GP Tujuan Kedua SMKN 7



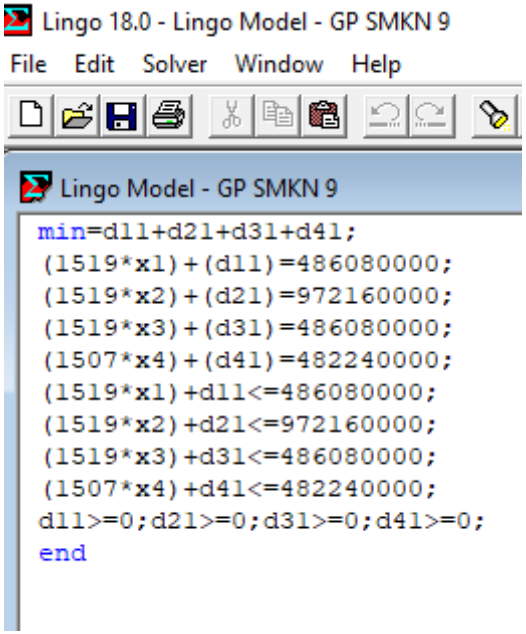

Lampiran 50. Output Perhitungan GP Tujuan Kedua SMKN 7



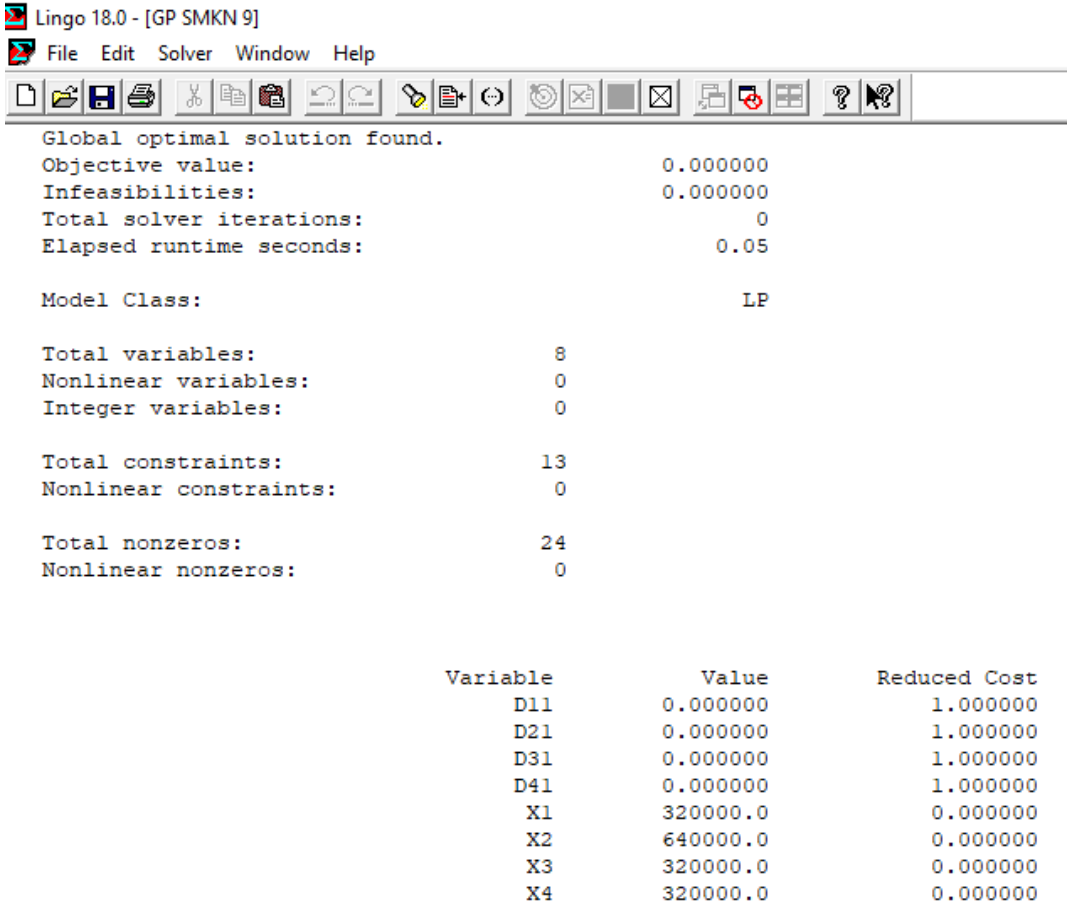

Lampiran 51. Skrip Perhitungan GP Tujuan Kedua SMKN 8



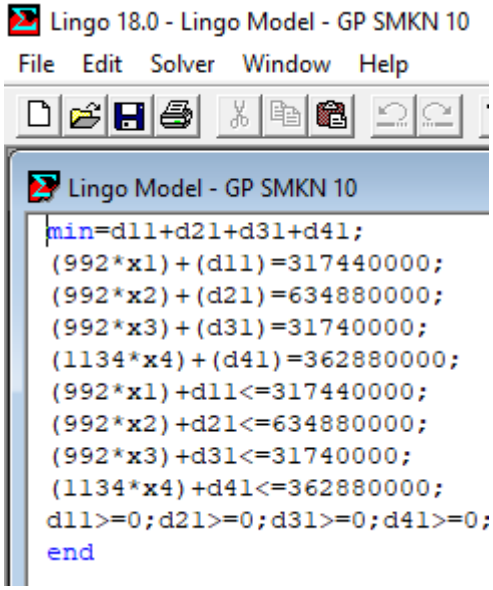

Lampiran 52. Output Perhitungan GP Tujuan Kedua SMKN 8



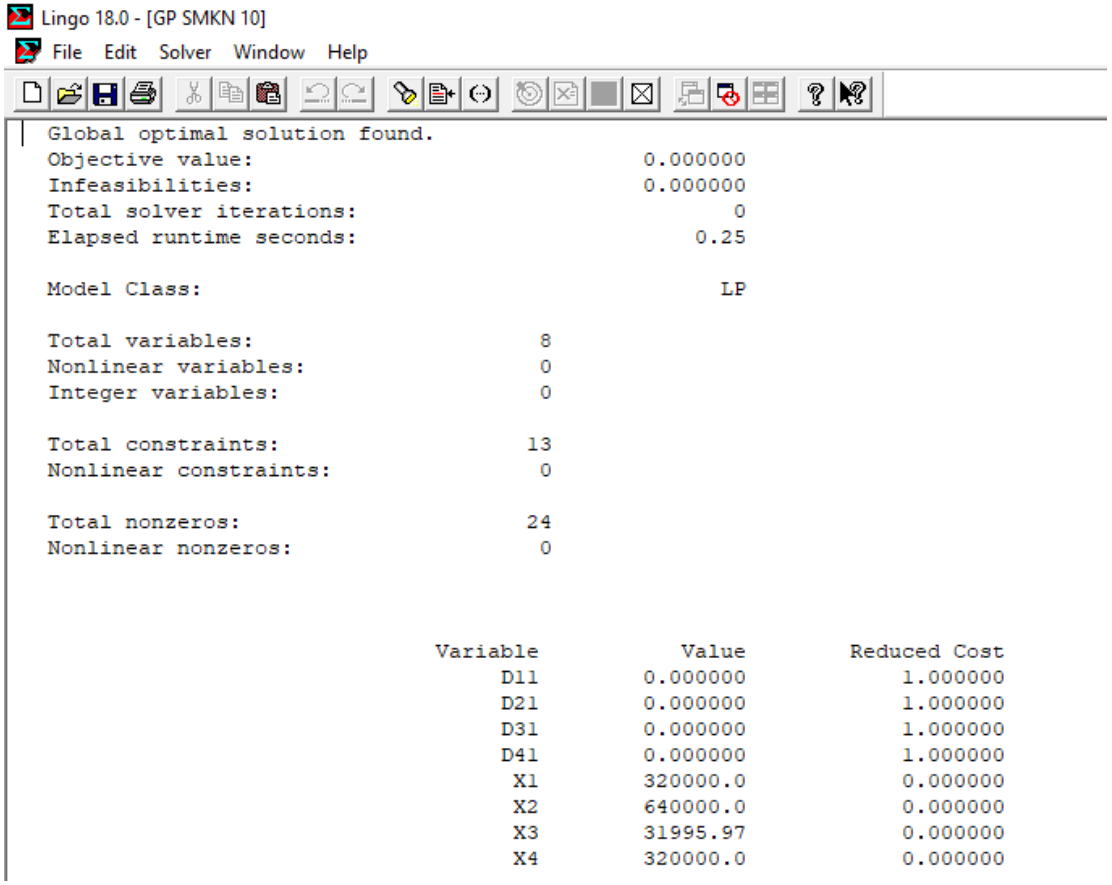

Lampiran 53. Skrip Perhitungan GP Tujuan Kedua SMKN 9



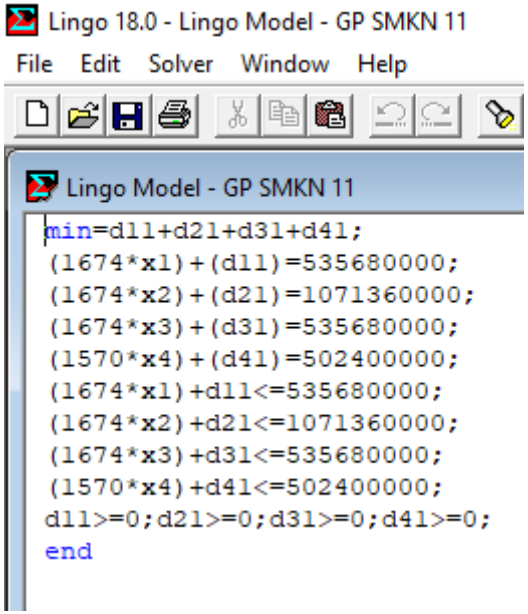

Lampiran 54. Output Perhitungan GP Tujuan Kedua SMKN 9



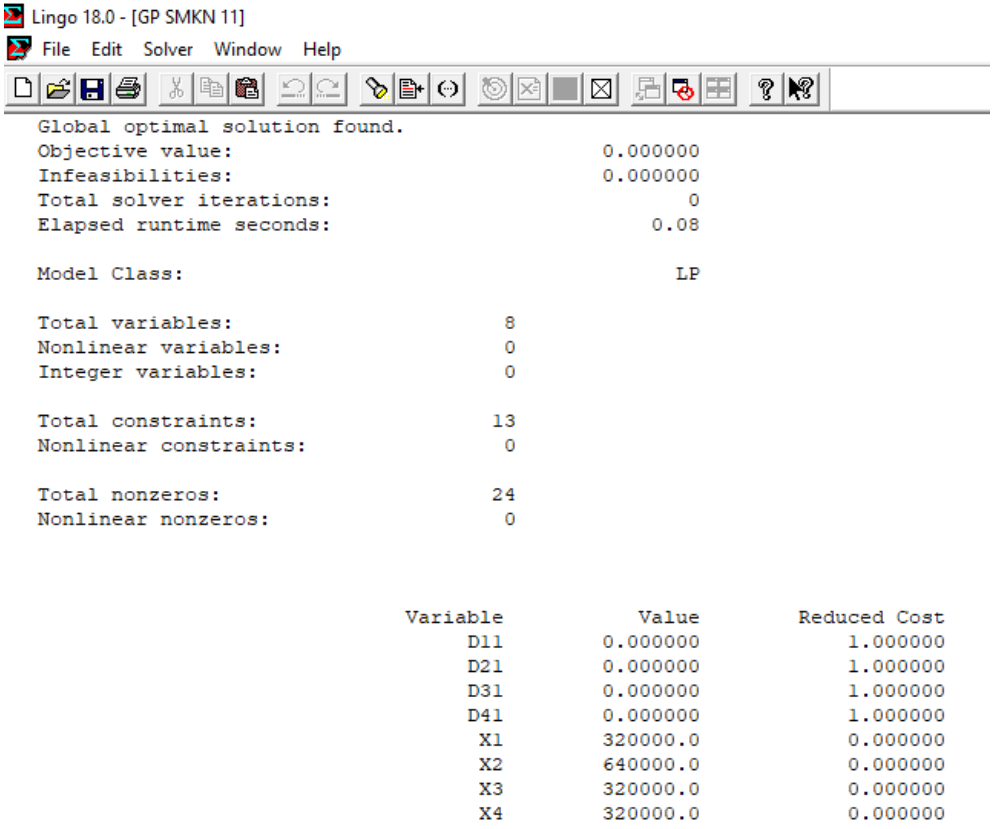

Lampiran 55. Skrip Perhitungan GP Tujuan Kedua SMKN 10



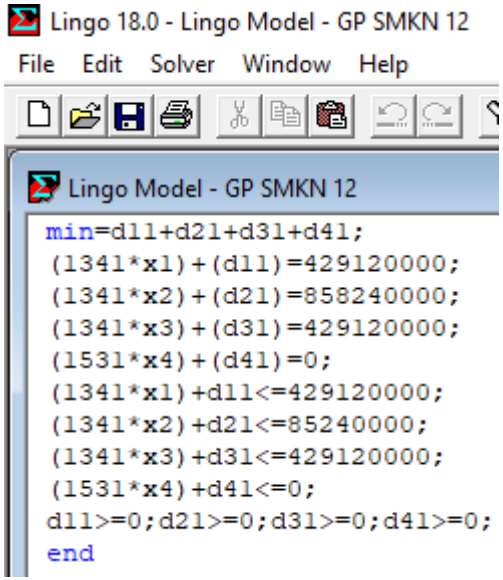

Lampiran 56. Output Perhitungan GP Tujuan Kedua SMKN 10



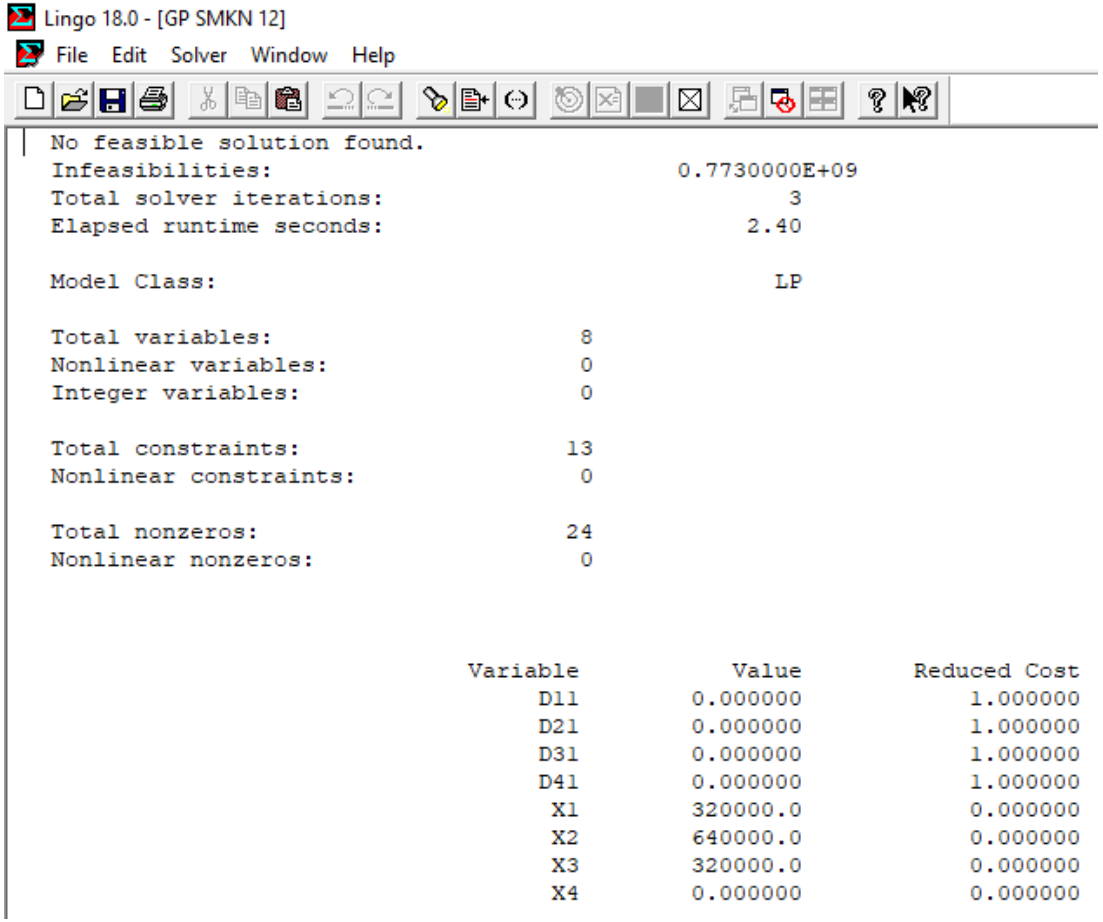

Lampiran 57. Skrip Perhitungan GP Tujuan Kedua SMKN 11



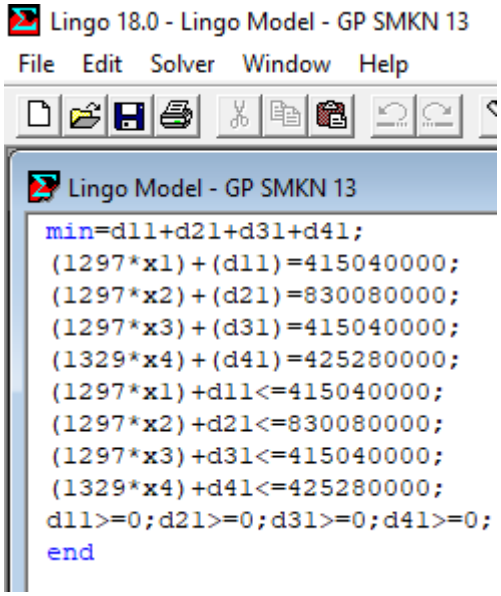

Lampiran 58. Output Perhitungan GP Tujuan Kedua SMKN 11



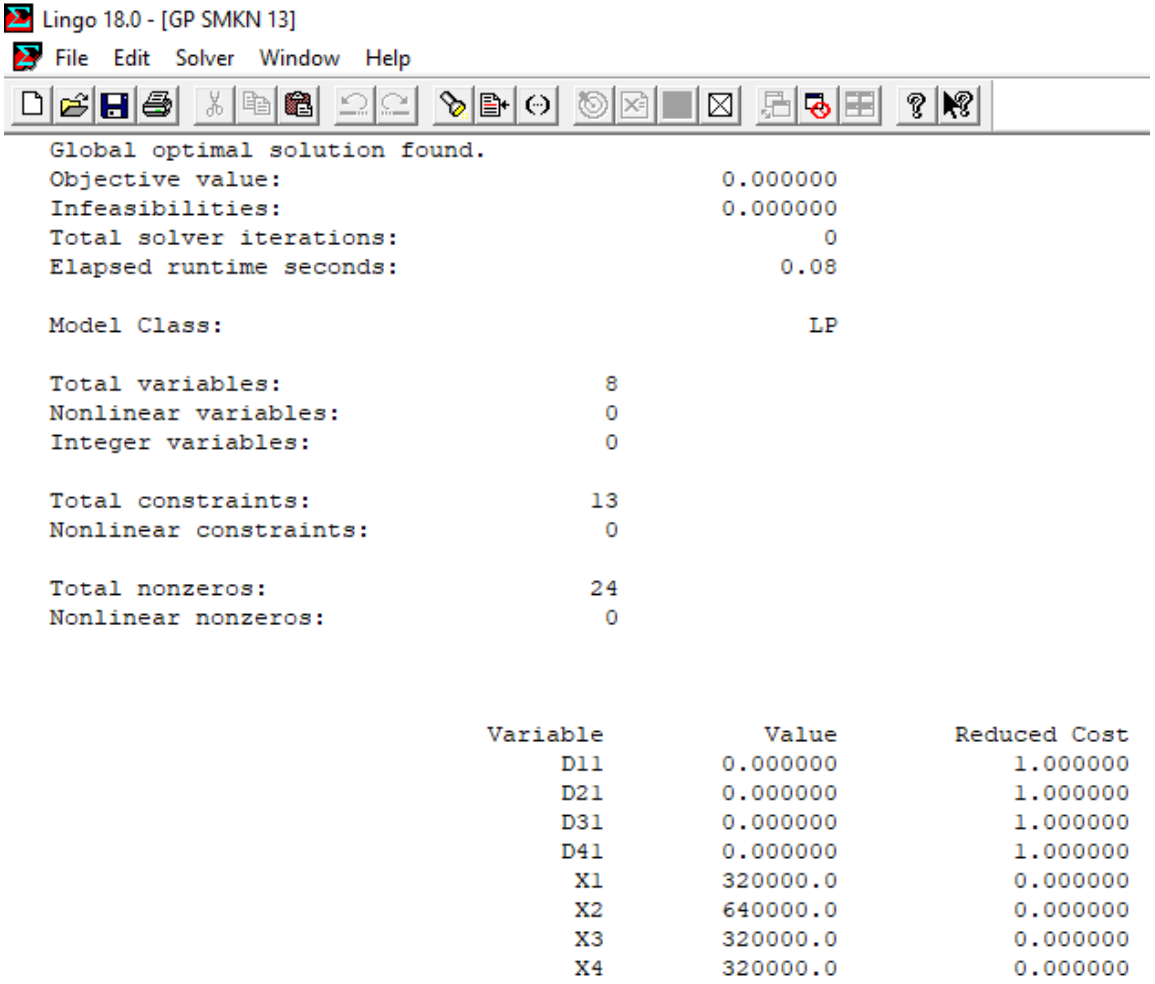

Lampiran 59. Skrip Perhitungan GP Tujuan Kedua SMKN 12

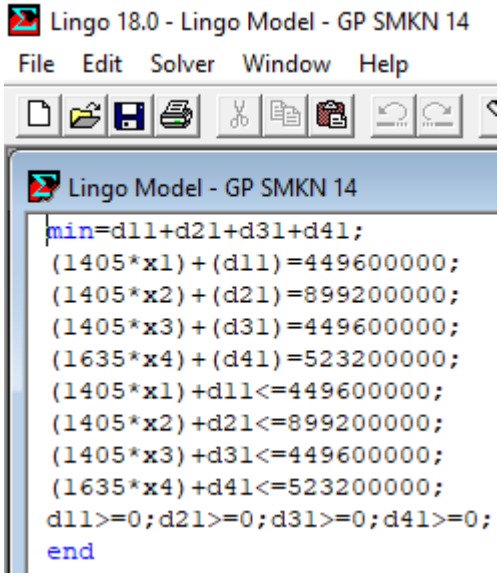



Lampiran 60. Output Perhitungan GP Tujuan Kedua SMKN 12

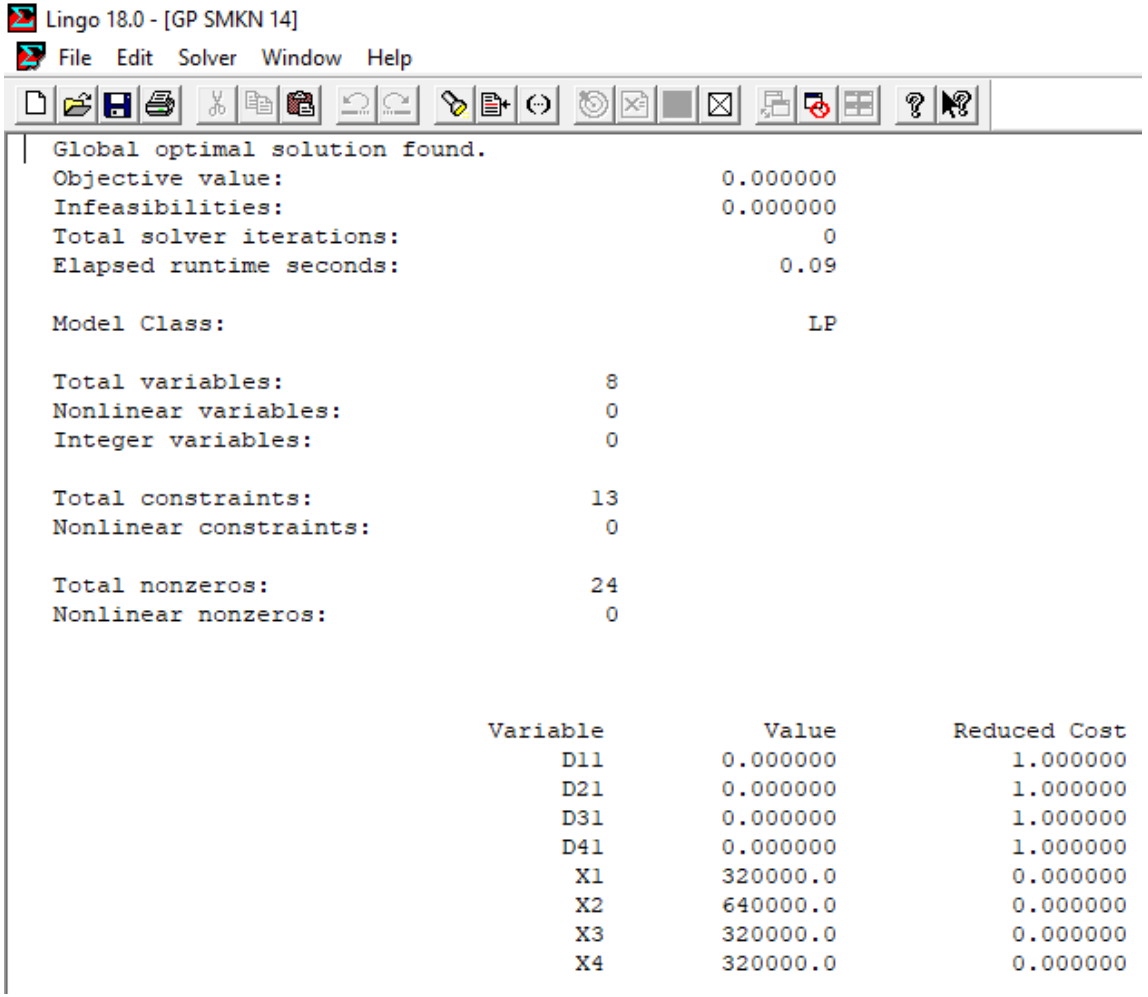



Lampiran 61. Skrip Perhitungan GP Tujuan Kedua SMKN 13

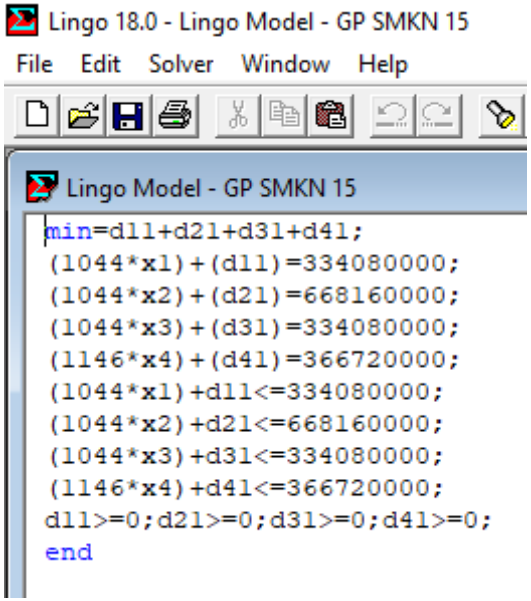




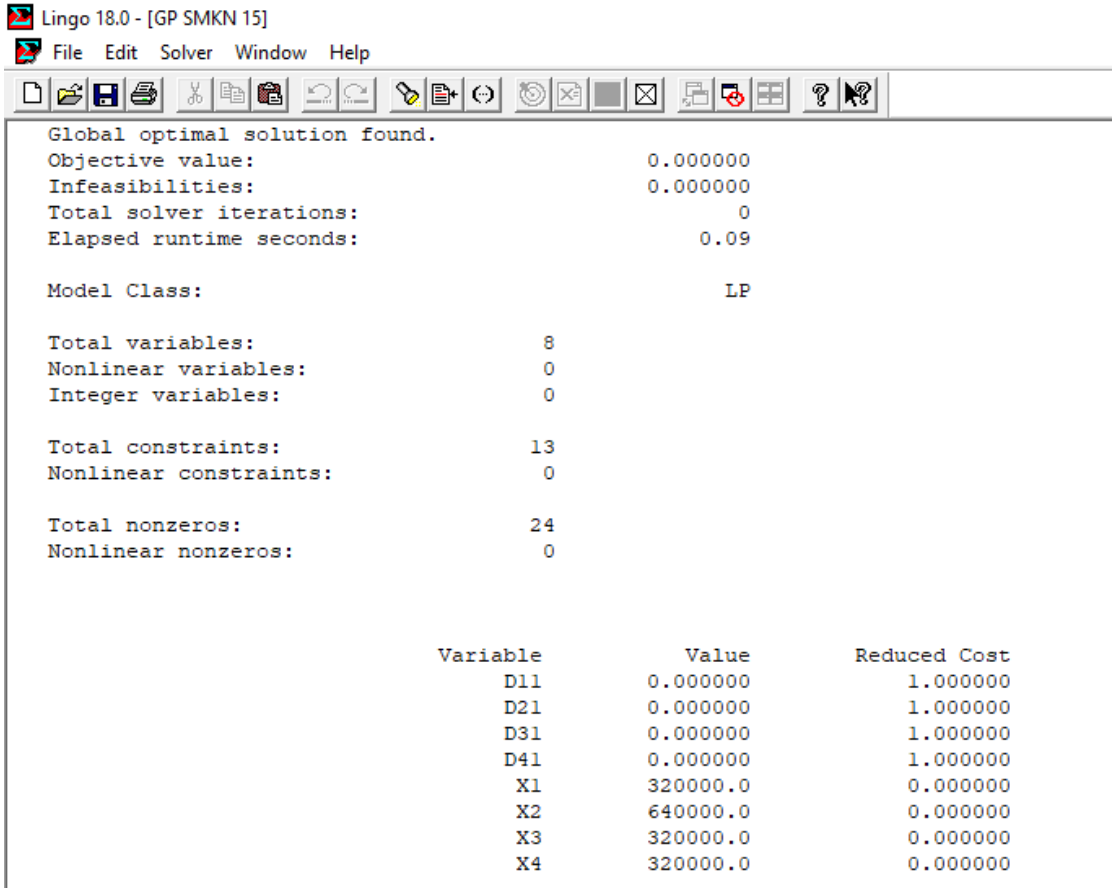

Lampiran 63. Skrip Perhitungan GP Tujuan Kedua SMKN 14



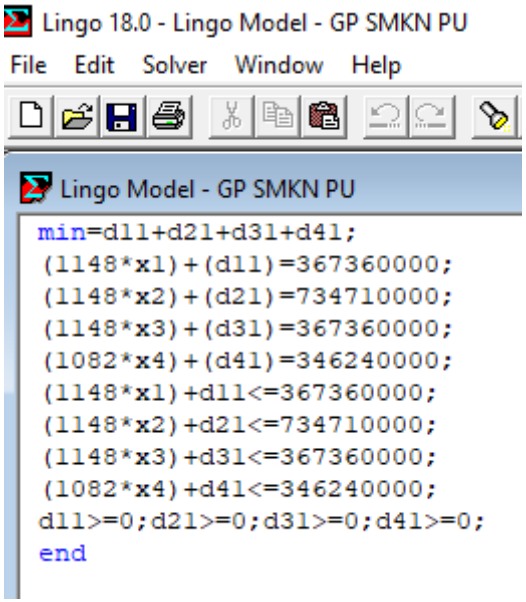

Lampiran 64. Output Perhitungan GP Tujuan Kedua SMKN 14



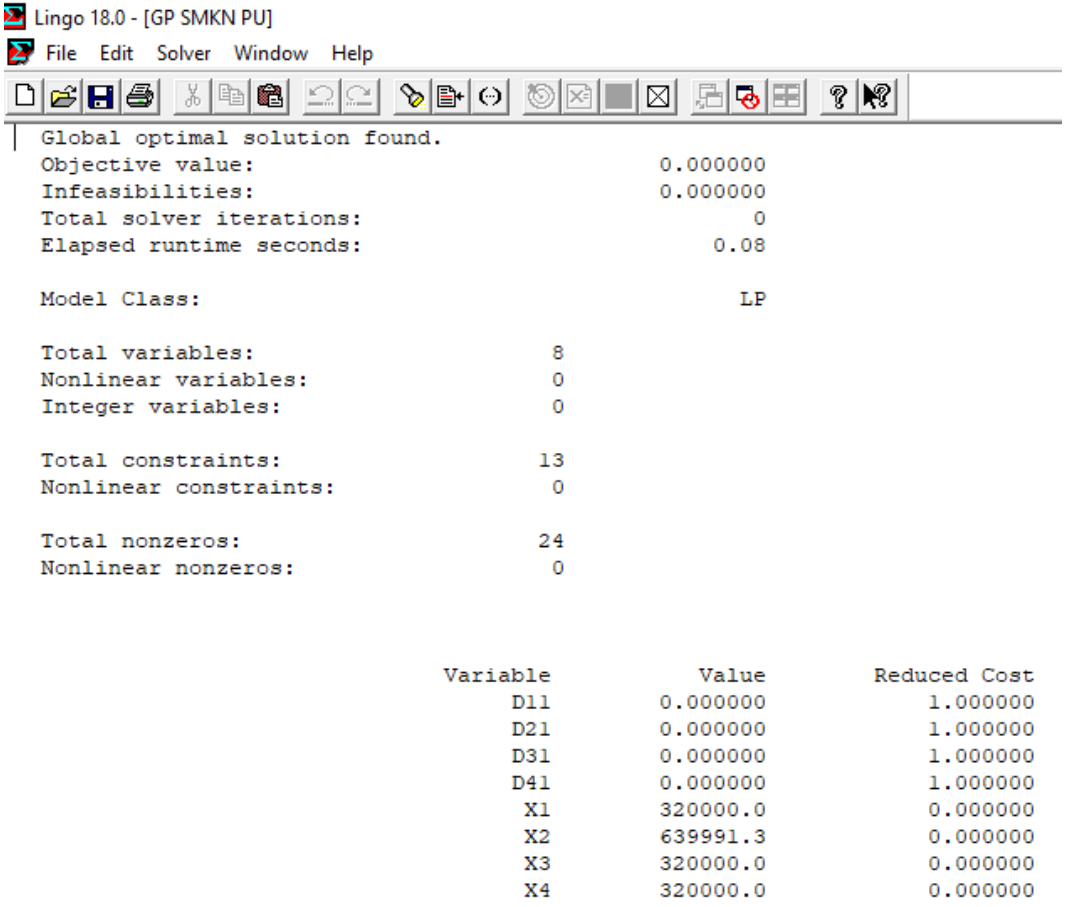

Lampiran 65. Skrip Perhitungan GP Tujuan Kedua SMKN 15




Lampiran 66. Output Perhitungan GP Tujuan Kedua SMKN 15




Lampiran 67. Skrip Perhitungan GP Tujuan Kedua SMKN PU




Lampiran 68. Output Perhitungan GP Tujuan Kedua SMKN PU