NAMA : VISENSIUS DONY PUTRA

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KELOMPOK : A11.4806

Selesaikan Model PL berikut dengan metode Simpleks:

**Max Z = 2X1 + X2 + 3X3 -> Max Z = 2X1 + X2 + 3X3 + 0S1 + 0S2 + 0S3**

Batasan:

**X1 + X2 + X3 < 59 -> X1+X2+X3+S1 = 59**

**2X1 + 3X3 < 75 -> 2X1 + 3X3 + S2 = 75**

**X2 + 6X3 < 54 -> X2 + 6X3 + S3 = 54**

**X1 ≥ 0, X2 ≥ 0, X3 ≥ 0**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |
| **0** | **S1** | **59** | **1** | **1** | **1** | **1** | **0** | **0** |
| **0** | **S2** | **75** | **2** | **0** | **3** | **0** | **1** | **0** |
| **0** | **S3** | **54** | **0** | **1** | **6** | **0** | **0** | **1** |
|  | **zj** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  | **cj - zj** |  | **2** | **1** | **3** | **0** | **0** | **0** |

**Baris zj kolom X1 = (0\*1)+(0\*2)+(0\*0) = 0**

**Baris zj kolom X2 = (0\*1)+(0\*0)+(0\*1) = 0**

**Baris zj kolom X3 = (0\*1)+(0\*3)+(0\*6) = 0**

**Baris zj kolom S1 = (0\*1)+(0\*0)+(0\*0) = 0**

**Baris zj kolom S2 = (0\*0)+(0\*1)+(0\*0) = 0**

**Baris zj kolom S3 = (0\*0)+(0\*0)+(0\*1) = 0**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |
| **0** | **S1** | **59** | **1** | **1** | **1** | **1** | **0** | **0** |
| **0** | **S2** | **75** | **2** | **0** | **3** | **0** | **1** | **0** |
| **0** | **S3** | **54** | **0** | **1** | **6** | **0** | **0** | **1** |
|  | **zj** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
|  | **cj - zj** |  | **2** | **1** | **3** | **0** | **0** | **0** |

Kolom X3 terpilih karena nilai cj-zj memiliki nilai terbesar yaitu 3

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** | **Kuantitas** |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** | **/kol pivot** |
| **0** | **S1** | **59** | **1** | **1** | **1** | **1** | **0** | **0** | **59/1 = 59** |
| **0** | **S2** | **75** | **2** | **0** | **3** | **0** | **1** | **0** | **75/3 = 25** |
| **0** | **S3** | **54** | **0** | **1** | **6** | **0** | **0** | **1** | **54/6 = 9** |
|  | **zj** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |  |
|  | **cj - zj** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |

Baris S3 terpilih karena nilai kuantitas nya terkecil yaitu 9

Perpotongan Kolom X3 dengan Baris S3 yaitu 6 terpilih sebagai pivot

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **3** | **X3** | **54/6** | **0/6** | **1/6** | **6/6** | **0/6** | **0/6** | **1/6** |  |
| **0** | **S1** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **zj** |  |  |  |  |  |  |  |  |
|  | **cj - zj** |  |  |  |  |  |  |  |  |

Untuk mencari Baris S1 yang baru digunakan rumus baris S1 lama – (nilai baris S1 sekolom pivot) \* Baris pivot

(59 1 1 1 1 0 0)

(x1) (9 0 1/6 1 0 0 1/6)

50 1 5/6 0 1 0 - 1/6

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **3** | **X3** | **9** | **0** | **1/6** | **1** | **0** | **0** | **1/6** |  |
| **0** | **S1** | **50** | **1** | **5/6** | **0** | **1** | **0** | **-1/6** |  |
| **0** | **S2** |  |  |  |  |  |  |  |  |
|  | **zj** |  |  |  |  |  |  |  |  |
|  | **cj - zj** |  |  |  |  |  |  |  |  |

Untuk mencari baris S2 yang baru digunakan rumus baris S2 lama – (nilai baris S2 sekolom pivot) \* Baris pivot

(75 2 0 3 0 1 0)

(x3) (9 0 1/6 1 0 0 1/6)

48 2 -3/6 0 0 1 -3/6

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **3** | **X3** | **9** | **0** | **1/6** | **1** | **0** | **0** | **1/6** |  |
| **0** | **S1** | **50** | **1** | **5/6** | **0** | **1** | **0** | **-1/6** |  |
| **0** | **S2** | **48** | **2** | **-1/2** | **0** | **0** | **1** | **-1/2** |  |
|  | **zj** | **27** | **0** | **1/2** | **3** | **0** | **0** | **1/2** |  |
|  | **cj - zj** |  | **2** | **1/2** | **0** | **0** | **0** | **-1/2** |  |

Kolom X1 terpilih karena nilai cj-zj memiliki nilai terbesar yaitu 2

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** | **Kuantitas** |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **3** | **X3** | **9** | **0** | **1/6** | **1** | **0** | **0** | **1/6** | **9/0 = tdk terdifinisi** |
| **0** | **S1** | **50** | **1** | **5/6** | **0** | **1** | **0** | **-1/6** | **50/1 = 50** |
| **0** | **S2** | **48** | **2** | **-1/2** | **0** | **0** | **1** | **-1/2** | **48/2 = 24** |
|  | **zj** |  | **0** | **1/2** | **3** | **0** | **0** | **1/2** |  |
|  | **cj - zj** |  | **2** | **1/2** | **0** | **0** | **0** | **-1/2** |  |

Baris S2 terpilih karena nilai kuantitas nya terkecil yaitu 24

Perpotongan kolom X1 dengan baris S2 yaitu 2 terpilih sebagai pivot

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **2** | **X1** | **48/2** | **2/2** | **-1/4** | **0/2** | **0/2** | **1/2** | **-1/4** |  |
| **0** | **S1** | **26** | **0** | **13/12** | **0** | **1** | **-1/2** | **1/12** |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **zj** |  |  |  |  |  |  |  |  |
|  | **cj - zj** |  |  |  |  |  |  |  |  |

Untuk mencari baris S1 yang baru digunakan rumus baris S1 lama – (nilai baris S1 sekolom pivot) \* Baris pivot

(50 1 5/6 0 1 0 -1/6)

(x1) (24 1 -1/4 0 0 1/2 -1/4)

26 0 13/12 0 1 -1/2 1/12

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **2** | **X1** | **48/2** | **2/2** | **(-3/6)/2** | **0/2** | **0/2** | **1/2** | **(-3/6)/2** |  |
| **0** | **S1** | **26** | **0** | **13/12** | **0** | **1** | **-1/2** | **1/12** |  |
| **3** | **X3** | **9** | **0** | **1/6** | **1** | **0** | **0** | **1/6** |  |
|  | **zj** |  |  |  |  |  |  |  |  |
|  | **cj - zj** |  |  |  |  |  |  |  |  |

Untuk mencari baris X3 yang baru digunakan rumus baris X3 lama – (nilai baris X3 sekolom pivot) \* Baris pivot

(9 0 1/6 1 0 0 1/6)

(x0) (24 1 -1/4 0 0 1/2 -1/4)

9 0 1/6 1 0 -1/2 1/6

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **2** | **X1** | **24** | **1** | **-1/4** | **0** | **0** | **1/2** | **-1/4** |  |
| **0** | **S1** | **26** | **0** | **13/12** | **0** | **1** | **-1/2** | **1/12** |  |
| **3** | **X3** | **9** | **0** | **1/6** | **1** | **0** | **0** | **1/6** |  |
|  | **zj** | **75** | **2** | **0** | **3** | **0** | **0** | **0** |  |
|  | **cj - zj** |  | **0** | **1** | **0** | **0** | **-1** | **0** |  |

Kolom X2 terpilih karena nilai cj-zj memiliki nilai terbesar yaitu 1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** | **Kuantitas** |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** | **/ kol pivot** |
| **2** | **X1** | **48/2** | **2/2** | **(-3/6)/2** | **0/2** | **0/2** | **1/2** | **(-3/6)/2** | **-96** |
| **0** | **S1** | **26** | **0** | **13/12** | **0** | **1** | **-1/2** | **1/12** | **24** |
| **3** | **X3** | **9** | **0** | **1/6** | **1** | **0** | **0** | **1/6** | **54** |
|  | **zj** |  | **2** | **0** | **3** | **0** | **0** | **0** |  |
|  | **cj - zj** |  | **0** | **1** | **0** | **0** | **-1** | **0** |  |

Baris S1 terpilih karena nilai kuantitas nya terkecil yaitu 24 -> **note: angka terkecil (abaikan plus minus)**

Perpotongan kolom X2 dengan baris S1 yaitu 13/12 terpilih sebagai pivot

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **2** | **X1** |  |  |  |  |  |  |  |  |
| **1** | **X2** | **24** | **0** | **1** | **0** | **12/13** | **-6/13** | **1/13** |  |
|  |  |  |  |  |  |  |  |  |  |
|  | **zj** |  |  |  |  |  |  |  |  |
|  | **cj - zj** |  |  |  |  |  |  |  |  |

Untuk mencari baris X1 yang baru digunakan rumus baris X1 lama – (nilai baris X1 sekolom pivot) \* Baris pivot

(24 1 -1/4 0 0 1/2 -1/4)

(x(-1/4))(24 0 1 0 12/13 -6/13 1/13)

30 1 0 0 3/13 5/13 -3/13

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **2** | **X1** | **30** | **1** | **0** | **0** | **3/13** | **5/13** | **-3/13** |  |
| **1** | **X2** | **24** | **0** | **1** | **0** | **12/13** | **-6/13** | **1/13** |  |
| **3** | **X3** |  |  |  |  |  |  |  |  |
|  | **zj** |  |  |  |  |  |  |  |  |
|  | **cj - zj** |  |  |  |  |  |  |  |  |

Untuk mencari baris X3 yang baru digunakan rumus baris X3 lama – (nilai baris X3 sekolom pivot) \* Baris pivot

(9 0 1/6 1 0 0 1/6)

(x 1/6)(24 0 1 0 12/13 -6/13 1/13)

5 0 0 1 -2/13 1/13 2/13

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** |  |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **2** | **X1** | **30** | **1** | **0** | **0** | **3/13** | **5/13** | **-3/13** |  |
| **1** | **X2** | **24** | **0** | **1** | **0** | **12/13** | **-6/13** | **1/13** |  |
| **3** | **X3** | **5** | **0** | **0** | **1** | **-2/13** | **1/13** | **2/13** |  |
|  | **zj** |  |  |  |  |  |  |  |  |
|  | **cj - zj** |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **cj** | **Variabel** |  | **2** | **1** | **3** | **0** | **0** | **0** | **Ket** |
|  | **Basis** | **Kuantitas** | **X1** | **X2** | **X3** | **S1** | **S2** | **S3** |  |
| **2** | **X1** | **30** | **1** | **0** | **0** | **3/13** | **5/13** | **-3/13** |  |
| **1** | **X2** | **24** | **0** | **1** | **0** | **12/13** | **-6/13** | **1/13** |  |
| **3** | **X3** | **5** | **0** | **0** | **1** | **-2/13** | **1/13** | **2/13** |  |
|  | **zj** | **99** | **2** | **1** | **3** | **12/13** | **7/13** | **1/13** |  |
|  | **cj - zj** |  | **0** | **0** | **0** | **-12/13** | **-7/13** | **-1/13** | **Optimal** |

**Karena semua hasil pada baris cj-zj hasil nya 0 dan negative maka bias dikatakan sudah optimal**

**Solusi : X1 =2 Z = (2\*30) + (1\*24) + (3\*5) = 60 + 24 +15 = 99**

**X2 = 1**

**X3 = 3**