**WQD 7011 – Numerical Optimization**

**Exercise 6 – Simplex Method**

Name : Aswadi Abdul Rahman

Matrix No : WQD180082

Solve the following linear programming problem using Table solution:

Maximize 3𝑥1 + 2𝑥2

With subject to, 2𝑥1 + 𝑥2 ≤ 18

2𝑥1 + 3𝑥2 ≤ 42

3𝑥1 + 𝑥2 ≤ 24

𝑥1, 𝑥2 ≥ 0

**Answer**

1st Iteration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **x1** | **x2** | **S1** | **S2** | **S3** | **Solution** | **Ratio** |
|  | **C** | 3 | 2 | 0 | 0 | 0 |  |  |
| **S1** | 0 | 2 | 1 | 1 | 0 | 0 | 18 | 9 |
| **S2** | 0 | 2 | 3 | 0 | 1 | 0 | 42 | 21 |
| **S3** | 0 | 3 | 1 | 0 | 0 | 1 | 24 | 8 |
| **Z1** |  | 0 | 0 | 0 | 0 | 0 |  |  |
| **C-Z1** |  | 3 | 2 | 0 | 0 | 0 |  |  |

2nd Iteration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **x1** | **x2** | **S1** | **S2** | **S3** | **Solution** | **Ratio** |
|  | **C** | 3 | 2 | 0 | 0 | 0 |  |  |
| **S1** | 0 | 0 | 0.333333 | 1 | 0 | -0.66667 | 2 | 6 |
| **S2** | 0 | 0 | 2.333333 | 0 | 1 | -0.66667 | 26 | 11.14286 |
| **x1** | 3 | 1 | 0.333333 | 0 | 0 | 0.333333 | 8 | 24 |
| **Z1** |  | 3 | 1 | 0 | 0 | 1 |  |  |
| **C-Z1** |  | 0 | 1 | 0 | 0 | -1 |  |  |

3rd Iteration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **x1** | **x2** | **S1** | **S2** | **S3** | **Solution** | **Ratio** |
|  | **C** | 3 | 2 | 0 | 0 | 0 |  |  |
| **x2** | 2 | 0 | 1 | 3 | 0 | -2 | 6 | -3 |
| **S2** | 0 | 0 | 0 | -7 | 1 | 4 | 12 | 3 |
| **x1** | 3 | 1 | 0 | -1 | 0 | 1 | 6 | 6 |
| **Z1** |  | 3 | 2 | 3 | 0 | -1 |  |  |
| **C-Z1** |  | 0 | 0 | -3 | 0 | 1 |  |  |

4th Iteration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **x1** | **x2** | **S1** | **S2** | **S3** | **Solution** | **Ratio** |
|  | **C** | 3 | 2 | 0 | 0 | 0 |  |  |
| **x2** | 2 | 0 | 1 | -0.5 | 0.5 | 0 | 12 |  |
| **S3** | 0 | 0 | 0 | -1.75 | 0.25 | 1 | 3 |  |
| **x1** | 3 | 1 | 0 | 0.75 | -0.25 | 0 | 3 |  |
| **Z1** |  | 3 | 2 | 1.25 | 0.25 | 0 |  |  |
| **C-Z1** |  | 0 | 0 | -1.25 | -0.25 | 0 |  |  |

x1=3, x2=12, S1=0, S2=0, S3=3

3(3) + 2(12) = 33