Assignment 5

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Excel |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  | TCD(X) | TCH(Y) |  |  |  |  |
| Cost | 22.8125 | 20.0625 |  |  |  |  |
|  |  |  |  |  |  |  |
| Total Cost | 42.875 |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Model | X | Y |  | Total Production | | Constraint |
| Decision Variable | 4.75 | 3.25 |  | 8 |  | 8 |
|  |  |  |  |  |  |  |

Answer Report

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | |  | | |  | |  | | |  |
|  | | | |  |  | |  | |
|  | | | |  |  | |  | |
| **Result: Solver found a solution. All Constraints and optimality conditions are satisfied.** | | | | | | | | | | | | | | | | |
| **Solver Engine** | | | | | | | | | |  | | |  |  |  |  |
|  | Engine: GRG Nonlinear | | | | | | | | |  | | |  |  |  |  |
|  | Solution Time: 0.032 Seconds. | | | | | | | | |  | | |  |  |  |  |
|  | Iterations: 4 Subproblems: 0 | | | | | | | | |  | | |  |  |  |  |
| **Solver Options** | | | | | | | | | |  | | |  |  |  |  |
|  | Max Time Unlimited, Iterations Unlimited, Precision 0.000001 | | | | | | | | | | | | |  |  |  |
|  | Convergence 0.0001, Population Size 100, Random Seed 0, Derivatives Central | | | | | | | | | | | | | | | |
|  | Max Subproblems Unlimited, Max Integer Sols Unlimited, Integer Tolerance 1%, Assume NonNegative | | | | | | | | | | | | | | | |
|  |  |  | | | | | | | |  | | |  |  |  |  |
| Objective Cell (Min) | | | | | | | | | |  | | |  |  |  |  |
|  | **Cell** | **Name** | | | | | | | | **Original Value** | | | **Final Value** |  |  |  |
|  | $B$12 | Total Cost TCD(X) | | | | | | | | 8 | | | 42.875 |  |  |  |
|  |  |  | | | | | | | |  | | |  |  |  |  |
|  |  |  | | | | | | | |  | | |  |  |  |  |
| Variable Cells | | | | | | | | | |  | | |  |  |  |  |
|  | **Cell** | **Name** | | | | | | | | **Original Value** | | | **Final Value** | **Integer** |  |  |
|  | $B$16 | Decision Variable X | | | | | | | | 0 | | | 4.75 | Contin |  |  |
|  | $C$16 | Decision Variable Y | | | | | | | | 0 | | | 3.25 | Contin |  |  |
|  |  |  | | | | | | | |  | | |  |  |  |  |
|  |  |  | | | | | | | |  | | |  |  |  |  |
| Constraints | | | | | | | | | |  | | |  |  |  |  |
|  | **Cell** | **Name** | | | | | | | | **Cell Value** | | | **Formula** | **Status** | **Slack** |  |
|  | $E$16 | Decision Variable Total Production | | | | | | | | 8 | | | $E$16>=$G$16 | Binding | 0 |  |

Sensitivity Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| Variable Cells | | |  |  |
|  |  |  | **Final** | **Reduced** |
|  | **Cell** | **Name** | **Value** | **Gradient** |
|  | $B$16 | Decision Variable X | 4.75 | 0 |
|  | $C$16 | Decision Variable Y | 3.25 | 0 |
|  |  |  |  |  |
| Constraints | | |  |  |
|  |  |  | **Final** | **Lagrange** |
|  | **Cell** | **Name** | **Value** | **Multiplier** |
|  | $E$16 | Decision Variable Total Production | 8 | 8.5 |
|  |  |  |  |  |

The objective goal: minimize cost

The decisions variables: X and Y

The cost function for Dayton Plant is TCD(X) = X2-3X+5

The cost function for Hamilton Plant is TCH(Y) = Y2+5Y+3

Therefore, the Mathematical Model to develop a min weekly Total cost function is:

Min cost = TCD(X) + TCH (Y)

= X^2 – X + 5 + Y^2 + 2\*Y + 3

Constraints: X+Y >= 0

X,Y > 0

According to the solver,

The optimal number of gloves to produce at Dayton is X = 4.75 thousand units.

The optimal number of gloves to produce at Hamilton is Y = 3.25 thousand units.