Integer Programming: Numerical Examples

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Numerical Example:1a
Solve the following IPP by Cutting Plane Method.

$$\max : Z = X_1 + 3X_2$$

Subject to

$$X_1 + X_2 \leq 10$$

$$X_1 + 2X_2 \leq 11$$

$$X_1 + 4X_2 \leq 16$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 7, X_2 = 2$$

Numerical Example:1b
Solve the following IPP by Cutting Plane Method.

$$\max : Z = X_1 + X_2$$

Subject to

$$5X_1 + X_2 \leq 10$$

$$10X_1 + 4X_2 \leq 25$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 0, X_2 = 6$$

Numerical Example:2

$$\max : Z = X_1 + X_2$$

Subject to

$$2X_1 + 5X_2 \leq 16$$

$$6X_1 + 5X_2 \leq 30$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 5, X_2 = 0$$

Numerical Example:3

$$\max : Z = 7X_1 + 9X_2$$

Subject to

$$-X_1 + 3X_2 \leq 6$$

$$7X_1 + X_2 \leq 35$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 4, X_2 = 3$$

Numerical Example: 4

$$\max : Z = 2X_1 + 3X_2$$

Subject to

$$4X_1 + X_2 \leq 9$$

$$X_1 + 4X_2 \leq 11$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 1, X_2 = 2$$

Numerical Example: 5

$$\max : Z = 2X_1 + 3X_2$$

Subject to

$$3X_1 + X_2 \leq 80$$

$$X_1 + 3X_2 \leq 70$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 21, X_2 = 16$$

Numerical Example 6:

$$\max : Z = 6X_1 + 5X_2$$

Subject to

$$5X_1 + 4X_2 \leq 20$$

$$4X_1 + 5X_2 \leq 19$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 4, X_2 = 0$$

Numerical Example 7:

$$\max : Z = 6X_1 + 5X_2$$

Subject to

$$5X_1 + 4X_2 \leq 40$$

$$4X_1 + 5X_2 \leq 38$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 8, X_2 = 0$$

Numerical Example 8:

$$\max : Z = 6X_1 + 5X_2$$

Subject to

$$3X_1 + 5X_2 \leq 17$$

$$5X_1 + 3X_2 \leq 19$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 3, X_2 = 1$$

Numerical Example 9:

$$\max : Z = X_1 + X_2$$

Subject to

$$3X_1 + 5X_2 \leq 34$$

$$5X_1 + 3X_2 \leq 38$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 5, X_2 = 3$$

Numerical Example 10:

$$\max : Z = X_1 + X_2$$

Subject to

$$3X_1 + 5X_2 \leq 51$$

$$5X_1 + 3X_2 \leq 57$$

$$X_1, X_2 = 0, 1, 2, 3...$$

ANS:

$$X_1 = 8, X_2 = 5$$