**Solution to an Integer LP May Not Be One of the Integer Vertices**

An Integer Linear Program: The following problem is from

***Linear Programming: Methods and Applications***,

by G.V. Shenoy, John Wiley & Sons, 1989.

Maximize 100X1 + 160X2

Subject to:

6X1 + 14X2 ≤ 42

7X1 + 7X2 ≤ 35

X1, X2 are non-negative integers.

For this small example, one may find all 14 feasible solutions directly from the feasible region, i.e., Figure 6.1 in the above reference. Using the objective function iso-value lines, the optimal solution is at point

(X1 = 4, X2 = 1) which gives the optimal value of 560. This solution is superior to (X1 = 5, X2 = 0) with objective function value of 500 given therein. Notice that the optimal solution in on the boundary line 7X1 + 7X2 = 35, but not a vertex as is found in the above reference.

Whenever there is integrality condition on some decision variable, then the optimal solution (if exists) might be located anywhere on the feasible region. It might be one of the vertices, could be on the boundary or even inside the feasible region.