Answer on Question 66367 - Math - Statistics and Probability

Question: Solve the following integer linear programming problem: *maximize*

$$2x_1 + 5x_2 + 7x_3$$

subject to the constrain $4x_1 + 3x_2 + x_3 \geq 29$, *where* x_1, x_2, x_3 *are non-negative integers.*

Solution: An integer linear programming problem (ILP) is a linear programming problem (LP) in which some or all of the variables are restricted to be integers. If LP admits an integer solution, then this solution is a solution of ILP. Otherwise, we must apply some special algorithms such as *the branch-and-bound algorithm.* However if LP is unbounded, then ILP is also unbounded.

Recall that a problem is unbounded if it has feasible solutions with arbitrarily large objective values. The problem under consideration is unbounded. In fact, for the sequence of feasible solutions $X_n = (n, 0, 0)$, where $n = 8, 9, \ldots$ the objective value $2n$ goes to infinity as $n \to +\infty$.

Answer: The problem is unbounded.