General Integer Linear Programs: Standard LP assumes that decision variables are continuous. However, in many applications, fractional values may be of little use (e.g., 2.5 employees). On the other hand, as you know by now, the integer linear programs are more difficult to solve, you might ask why we bother. Why do we not simply use a standard linear program and round the answers to the nearest integers? Unfortunately, there are two problems with this:

(1) The rounded solution may be infeasible   (2) Rounding may not give an optimal solution

Therefore, rounding the results from linear programs can give reasonable answers, but to guarantee optimal solutions we have to use integer linear programming. By default, LP Software assume that all variables are continuous. In using Lindo software, you will want to make use of the general integer statement - GIN. GIN followed by a variable name restricts the value of the variable to the nonnegative integers (0,1,2,…). The following small example illustrate the use of the GIN statement.

    Max 11X1 + 10X2
    S.T. 2X1 + X2 ≤ 12
        X1 - 3X2 ≥ 1
    END
    GIN X1
    GIN X2
    The output after 7 iterations is:
        OBJECTIVE FUNCTION VALUE
        1)   66.00000
     VARIABLE   VALUE   REDUCED COST
        X1   6.000000   -11.000000
        X2   0.000000   -10.000000
        ROW   SLACK OR SURPLUS
        2)   0.000000
        3)   5.000000

Had we not specified X1 and X2 to be general integers in this model, LINDO would not have found the optimal solution of X1 = 6 and X2 = 0. Instead, LINDO would have treated X1 and x2 as continuous and returned the solution of X1 = 5.29 and X2 = 1.43.
Note also, that simply rounding the continuous solution to the nearest integer values does
not yield the optimal solution in this example. In general, rounded continuous solutions may be non optimal and, at worst, infeasible. Based on this, one can imagine that it can be very time consuming to obtain the optimal solution to a model with many integer variables. In general, this is true, and you are best off utilizing the GIN feature only when absolutely necessary.