Solution Set of Linear Simultaneous Inequations

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Abstract:- Inequations are used in various fields. Graphical method of solution does not provide explicit solution. A method is suggested in respect of Linear Simultaneous Inequations with two variables, extendable to any number of variables, to provide explicit solution in the form of solution set. The method may also be used for optimization.

Key words:- Inequations, Separation of sections, Group (combination) of ….

1.Introduction:- Inequations are being used in various fields of Science. Most probably, the method used herein is a non-traditional and new one. Graphical method (two/three/multi dimensional) of solution [A] does not provide explicit solution of Simultaneous Inequations, provides pictorial solution only. The present method provides explicit solution, i.e. solution set of Linear Simultaneous Inequations with two variables, extendable to any number of variables, This method may also be used to solve Optimization problems.

2. Method:- Let us take a representative example, to solve x+y>=6…(1) and 2x+3y>=16…(2). From (1), x>=6-y and from (2), x>=(16-3y)/2. So, either 6-y>=(16-3y)/2…section (I) or, 6-y<=(16-3y)/2…section (II). At first, we have made separation of sections (of solution). From section (I), y>=4 or, y=4+a' where a'>=0. From section (II), y<=4 or, y+4-a" where a">=0. In section (I), from (1), x>=2-a' and from (2), x>=2-3a'/2. So, x>=2-a' [2-a'>=2-3a'/2 as a'>=0]. So, S(I)={x>=2-a',y=4+a'} where a'>=0. Similarly, S(II)={x>=2+3a"/2,y=4-a"} where a">=0. Therefore, complete solution is S=S(I)^S(II) where ^ stands for intersection (of sets). Now, to minimize 4x+5y. From section (I), z=28+a', so zmin=28, for x=2 and y=4. From S(II), z>=28+a", so zmin=28, for x=2, y=4. Accordingly, ultimate zmin=28, for x=2and y=4.

3. Conclusion:- (i) If there were three or more Linear Simultaneous Inequations with two variables, a group (combination) of each two of those will have to be considered. (ii) If conditions were imposed, x>=0, y>=0, maximum value of a' or a" (to be determined using x>=0 otherwise y>=0) might have been required for Optimization in some specific cases. (iii) The method can be extended in number of variables.

Reference:- G.Hardy, Linear Programming, Addision Wesley Publishing Company (1978) … [A].

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