Indian Statistical Institute
B. Math. Hons. III Year
Semestral Examination 2002-2003 (Backpaper)
Optimization
Max. Marks: 100   Instructor: S. Ramasubramanian

1. Using the simplex algorithm (writing down the tableau at each stage) solve: Minimize $2x_1 - 3x_2 + x_3$ subject to $x_1 + 3x_2 = 6, x_1 + 2x_2 + x_3 = 8, x_1 \geq 0, x_2 \geq 0, x_3 \geq 0$. [20]

2. If the modified costs $\bar{c} \geq 0$ at a basic feasible solution $x^{(0)}$ of an LPS, show that $x^{(0)}$ is optimal. [15]

3. Show that the following are equivalent:
   (a) There exists a solution to $Ax \leq b$;
   (b) $A^T y = 0, y \geq 0$ imply $b^T y \geq 0$. [20]

4. Describe briefly the main steps of Karmarkar's algorithm to solve a Karmarkar standard form linear program. [25]

5. Using Lagrangean method, find the maximum and minimum of $(x^2 - y^2)$ subject to the constraint $x^2 + y^2 = 1$. [20]