11.02.2021

Mathematical Programing2
Assignment Problems

1. Discuss the Dantzig-Wolfe decomposition Algorithm
2. Explain modified simplex method for quadratic programming with example.
3. Discuss the reasons for data uncertainty in robust optimization.
4. Illustrate uncertain linear optimization problem with an example.
5. Explain Farkas lemma with an example.
6. Explain various variants of Farkas Lemma
7. Consider m,n = 2 and $A = \begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$ *and* $b = \begin{bmatrix} b_1 \\ b_2 \end{bmatrix}$. Explain the Farkas lemma with the given system. (Depending on b_1 and b_2).
8. Discuss the branch and price search algorithm with an example.
9. Discuss Sequential Unrestrained Maximization Technique with graphical interpretation
10. Applying decomposition with the constraints $0 \le x1 \le 1$ and $0 \le x2 \le 1$ as the sub problem.
11. Find the maxima and minimum values of $f(x,y) = 10x^2 + y^2$ subject to the constraint $4x^2 + 2y^2 = 9$
12. Give the graphical illustration of Nonlinear Programming.
    $Maximize\ Z = 3x_1 + 5x_2,$
    Subject to $x_1 \le 2, x_1 + 2x_2 \le 8, and\ x_1, x_2 \ge 0$
13. Apply Wolfe's method for solving the quadratic programming problem:
    $Max\ Z = 10x_1 + 20x_2 - {x_1}^2 + 2x_1x_2 - {x_2}^2$
    Subject to $x_1 + x_2 \le 6$, $x_1 + x_2 \le 8$,and $x_1, x_2 \ge 0$.
14. Solve the NLPP graphically:
    $Maximize\ \ x_1 - x_1^2 + 2x_2 - x_2^2,$
    Subject to $x_1 + x_2 \le 12,\ \ x_1 - x_2 \le 6,$ and $x_1, x_2 \ge 0.$
15. Solve the NLPP graphically:
    Maximize $20x_1 - x_1^2 + 10x_2 - x_2^2,$
    Subject to $2x_1 + x_2 \le 12, x_1 - x_2 \le 6, x_1, x_2 \ge 0.$
16. Solve the following Quadratic programming Problem
    Max $z=x_1+x_2-x_1^2-2x_1x_2-2x_2^2$
    Subject to the conditions: $x1+x_2 \le 2, x_1 \ge 0, x_2 \ge 0$
17. Solve the following LPP by using Dynamic Programming
    Max $z=3x_1+4x_2$, Subject to the conditions $x1+2x_2 \le 2$,$x2 \le 3$ and, $x_1 \ge 0, x_2 \ge 0$

18. *Use the Kuhn-Tucker conditions to solve the following non-linear programming problem:*
    Maximize $Z = 7x_1^2 - 6x_1 + 5x_2^2,$
    subject to the constraints $x_1 + 2x_2 \le 10,$
    $x_1 - 3x_2 \le 9,$
    $x_1, x_2 \ge 0.$

19. Determine the values of x1 and x2 so as to Minimize $z=x_1^2+x_2^2$
    Subject to : $x_1+2x_2 \ge 8, x_1+x_2 \ge 8, 2x_1+x_2 \ge 10, x_1, x_2 \ge 0$
19. Determine the shortest path using Dynamic Programming