OPERATIONS RESEARCH

PRE-TEST EXAM December 23, 2019 - A

IMPORTANT: READ CAREFULLY

The score on the pre-test does not enter the final evaluation .

You answer by crossing the correct answer on the answer paper which is the only you give us back.

Minimum score 5 to be admitted to the written exam.

Given the problem (P)

$$\begin{aligned} \max \quad & f(x) = 5x_1 - 3x_2 \\ & x_1^2 + x_2^2 \leq 4, \\ & 2x_1 + 3x_2 \geq 1, \\ & x_1, x_2 \geq 0 \end{aligned}$$

1. The problem (P) is a Linear Problem **True** **False**
2. The feasible region of problem (P) is a polyhedron **True** **False**
3. The gradient of the objective function never vanishes ($\nabla f(x) \neq 0$ for all $x \in S$) **True** **False**
4. The point $\widehat{x} = (2,\ 0)^T$ is feasible **True** **False**
5. In the point $\widehat{x} = (2,\ 0)^T$ we have two active constraints **True** **False**

Given the problem (P_1)

$$\begin{aligned} \max \quad & 5x_1 - 3x_2 \\ & x_1 + x_2 + x_3 = 2, \\ & 2x_1 + 3x_2 - x_4 = 1, \\ & x_1, x_2, x_3, x_4 \geq 0 \end{aligned}$$

6. The points $(1-\beta)\begin{pmatrix} 0 \\ 2 \\ 0 \\ 5 \end{pmatrix} + \beta \begin{pmatrix} \frac{1}{2} \\ 0 \\ \frac{3}{2} \\ 0 \end{pmatrix}$ are feasible for any value of $\beta \in [0,1]$ **True** **False**
7. The direction $d = (0,\ 1,\ 0,\ 0)^T$ is a descent direction **True** **False**
8. The dual problem has two variables **True** **False**
9. The submatrix $\begin{pmatrix} 1 & 1 \\ 3 & 0 \end{pmatrix}$ is a basis for A **True** **False**
10. A BFS[1] must have at least two component x_i equal to zero **True** **False**

[1] Basic Feasible solution