OPERATIONS RESEARCH

PRE-TEST EXAM December 21, 2018

IMPORTANT: READ CAREFULLY

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

Only the correct answer is reported.

Minimum score 5 to be admitted to the written exam.

Given the problem (P)

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

1. The problem (P) is a Linear Problem **False**
2. The feasible region of problem (P) is convex **True**
3. Candidates to be minimizers of problem (P) are those satisfying $\nabla f = 0$ **False**
4. The point $\widehat{x} = (1,\ 0)^T$ is feasible **True**
5. In the point $\widehat{x} = (1,\ 0)^T$ we have two active constraints **True**
6. The gradient $\nabla f(x)$ is a vector with three components **False**

Given the problem (P_1)

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

7. The direction $d = (0,\ 1,\ 0)^T$ is a descent direction **True**
8. The submatrix $\begin{pmatrix} 3 & -1 \\ -1 & 1 \end{pmatrix}$ is a basis for A **True**
9. The dual problem has two variables **True**
10. The problem (P_1) is convex **True**