

Name _____

WSU ID# _____

Math 364 Quiz – Week #12

Consider the following standard form linear program.

$$\begin{array}{ll} \max_x & z = c^T x \\ \text{s.t.} & Ax = b \\ & x \geq 0 \\ & x \in \mathbb{R}^5 \end{array} \quad \begin{array}{l} x = [x_1 \ x_2 \ x_3 \ x_4 \ x_5]^T \\ c = [1 \ 1 \ 2 \ 1 \ 2]^T \\ A = \begin{bmatrix} -1 & 1 & 1 & 0 & 1 \\ 1 & -1 & 1 & 1 & 0 \\ 2 & 3 & 0 & 0 & 1 \end{bmatrix} \\ b = [6 \ 3 \ 15]^T \end{array}$$

1. What is the basic solution associated with the basis $B = \{1, 4, 5\}$?

At the solution, the nonbasic variables have value zero: $x_2 = x_3 = 0$. The remaining variables must satisfy the equality constraints:

$$-x_1 + x_5 = 6, \quad x_1 + x_4 = 3, \quad 2x_1 + x_5 = 15$$

with solution: $x_1 = 3, x_4 = 0, x_5 = 9$. Thus, the basic solution is

$$x = (3, 0, 0, 0, 9).$$

2. Is this solution a basic feasible solution? Why or why not?

This basic solution is a basic feasible solution because it satisfies all constraints. It is a solution to the equality constraints and $x \geq 0$.