

Name _____

WSU ID# _____

Math 364 Quiz – Week #11 – SOLUTIONS

1. [7 pts] Suppose we have binary variables $x_k \in \{0, 1\}$. Give a linear constraint, or linear constraints, that model the condition “If $x_1 = 1$ and $x_2 = 1$, then $x_3 = 0$.”

Here are several equally valid possibilities:

- (a) $x_1 + x_2 + x_3 \leq 2$
- (b) $2x_1 + 2x_2 + x_3 \leq 4$
- (c) $x_1 + x_2 + 2x_3 \leq 3$
- (d) $x_3 \leq y, x_1 + x_2 \leq 2 - y, y \in \{0, 1\}$

2. [3 pts] Justify that your constraint(s) satisfy the given condition.

Notice that [cases (a),(b),(c)] if $x_1 = x_2 = 1$ then x_3 is forced to be zero so that the sum does not exceed the upper bound. However, if either or both of x_1, x_2 are zero, then x_3 could be either zero or one without exceeding the upper bound. Justification of case (d) is left to the reader.