Math 4200
Assignment 4

Text Exercises: Sets − 1 , 2 , 3 , 4 , 8 , 10

1. Let $S = \{ x_1 , x_2 , \ldots , x_n \}$. Suppose that $A \subset S$ and that A is represented by the binary sequence $a_1 a_2 \ldots a_n$. This means that $a_j = 1$ *if* $x_j \in A$ *and* $a_j = 0$ *if* $x_j \notin A$.

    a) How can the number of elements of A be determined from $a_1 a_2 \ldots a_n$?

    b) Which binary sequence corresponds to $\varnothing$?

    c) Which sequence corresponds to $A = \{ x_1 , x_4 , x_7 , \ldots , x_9 \}$ Assume $n > 9$.

    d) Use the Fundamental Counting Principle to determine the number of subsets of S .

2. Let U be a set and A, B, C be subsets of U . Prove that

    $A \times (B \cup C) = (A \times B) \cup (A \times C)$.

3. Let R^+ denote the positive real numbers. For $\delta \in R^+$, *let* $B_\delta = (13 - \delta , 13 + \delta)$.

    Find $\bigcap_{\delta \in R^+} B_\delta$ and $\bigcup_{\delta \in R^+} B_\delta$.