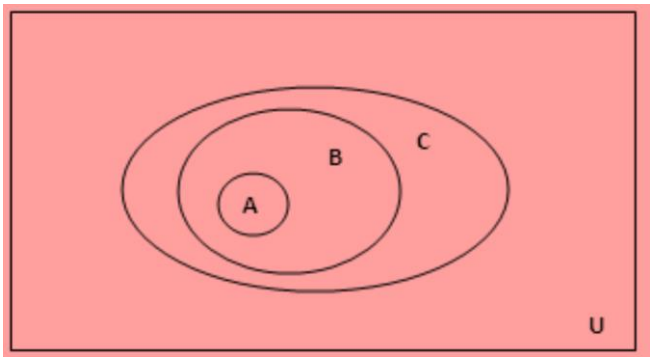
TMF1814 DISCRETE MATHEMATICS
TUTORIAL 1

1.1 Sets

1. Use a Venn diagram to illustrate the relationship $A \subseteq B$ and $B \subseteq C$.



2. What is the cardinality of each of these sets?
   (a) $\emptyset$
   The empty set has no elements, so its cardinality is 0.

   (b) $\{\emptyset\}$
   This set has one element (the empty set), so its cardinality is 1.

   (c) $\{\emptyset, \{\emptyset\}\}$
   This set has two elements, so its cardinality is 2.

   (d) $\{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}$
   This set has three elements, so its cardinality is 3.

3. Can you conclude that $A = B$ if A and B are two sets with the same power set?
   The union of all the sets in the power set of a set X must be exactly X. In other words, we can recover X from its power set, uniquely. Therefore the asnwer is yes.

4. What is the Cartesian product $A \times B$ where A is the set of courses offered by the mathematics department in the university and B is the set of mathematics professors at the university?
   By definition, it is the set of all ordered pairs (c; p) such that c is a course and p is a professor.

1.2 Set Operations

5. Let A = {a, b, c, d, e} and B = {a, b, c, d e, f, g, h}. Find
   (a) $A \cup B$
   - *{a, b, c, d, e, f, g, h} = B*