CMPSC 360 Discrete Mathematics for Computer Science
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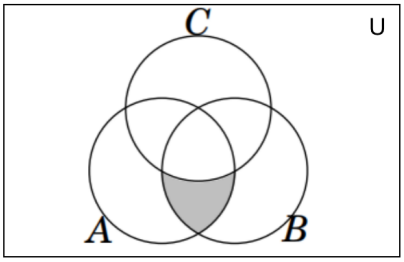
Worksheet 1

1. **Venn Diagrams:** Consider three sets A, B, and C. Based on the questions below either draw a Venn diagram representing the set operation or name the set operation based on the Venn diagram.

   1. $(A-B)\cap C$
   2. 

2. **Roster Method:** Describe the sets given below using the Roster method.

   (i) The set of all even prime numbers.
   (ii) The set of all real-valued solutions for the equation $x^5 - x^4 + x - 1 = 0$.
   (iii) The set of all letters in the word "MATHEMATICS" that are consonants.
   (iv) The set of all integers x such that x is a perfect square between 10 and 50.

3. **Set Builder method:** Describe the sets given below using the Set Builder method.

   (i) $\{-\sqrt{3}, \sqrt{3}\}$
   (ii) $\{2,4,8,16,32,64,\ldots\}$
   (iii) $\{\ldots,-11,-6,-1,4,9,14,19,24,29,\ldots\}$
   (iv) $\{1,3,6,10,15,\ldots\}$
   (v) $\{\ldots,\frac{1}{8},\frac{1}{4},\frac{1}{2},1,2,4,8,\ldots\}$

4. **Power set:** Write the power set of each of the following sets in roster form:

   (i) $\{1,(0,3),\{1\}\}$
   (ii) $\{\#,\{n,m\},\varnothing\}$

   Answer:

5. **Cartesian Products:**

1. Suppose $A = \{0,1\}$ and $B = \{1,2\}$. Find out $(\wp(A) \cap \wp(B)) \times (\wp(A) - \wp(B))$.
2. (i) How many elements are in $\{\} \times \{1,2\}$?
   (ii) Find out $\{\emptyset\} \times \{0,\emptyset\} \times \{0,1\}$

6. Sets Identity Laws: Use set identities for the following subproblems. Let A, B, and C be sets:

(i) Show that $(A-B)-C = A-(B \cup C)$

(ii) Show that $(B-A) \cup (C-A) = (B \cup C)-A$

(iii) Show that $A-(B \cup C) = (A-B) \cap (A-C)$