CS-302 Theory of Computation
Assignment 1

Name: _____

1. **(9 points)** Assume that A and B are sets. In each case, find a simplest expression representing the given set.
   - $(A - B) \cup (B - A) \cup (A \cap B)$

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   - $A \cup (B \cap ((A - (B - A)))$

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   - $\bar{A} \cup (B - (A \cup (\bar{B} - A)))$

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2. **(4 points)** What is the relationship between $2^{(A \cup B)}$ and $2^A \cup 2^B$? (Under what circumstances are they equal? If they are not equal, is one necessarily a subset of the other, and if so, which one?) Give reasons for your answers.

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3. **(3 points)** What is the relationship between $2^{(A \cap B)}$ and $2^A \bigcap 2^B$? (Under what circumstances are they equal? If they are not equal, is one necessarily a subset of the other, and if so, which one?) Give reasons for your answers.

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4. **(4 points)** Prove the second DeMorgan's Law:

$$A - (B \cap C) = (A - B) \cup (A - C)$$