# Homework 01 - Set Theory

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**Instructions:** Copy the following problems onto your own paper and write your proofs / answers following each problem. You must upload a pdf copy of your answers to Brightspace by the end of the day on the due date.

See the course syllabus for notes on my expectations for written proofs and their corresponding grades. Your first written attempt at a proof is SCRATCH WORK and should not be what you submit. Treat this like an essay: first you create rough drafts before you submit your final version.

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**1.** Consider the sets

$$A = \{1, 2, 3, 4\}$$
$$B = \{2, 4, 6, 8\}$$
$$C = \{0, 1, 2, 6\}$$

Compute the following sets. (Write your answer in set notation, e.g. $A \cap C = \{1, 2\}$)

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

**2.** Let $A = \{1, 2, 3\}$. List all subsets of $A$. How many subsets does $A$ have?

**BONUS** If $X$ has $n$ elements, then how many subsets does $X$ have?

**3.** Prove the second distributive property of intersections and unions.

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