

CGS698C, Assignment 01

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Part 1: Sets

- 1.1 You are given two sets: $A = \{x|x \in \mathbb{R} \text{ and } -1 \leq x \leq 2\}$ and $B = \{x|x \in \mathbb{R} \text{ and } 1 \leq x \leq 4\}$. Find the following
- (a) $A \cup B$
 - (b) $A \cap B$
 - (c) $A \setminus B$
 - (d) $\bar{A} \cap B$, where \bar{A} represents the complement of A such that $\bar{A} = \{x|x \in \mathbb{R} \text{ and } x \notin A\}$

Part 2: Probability

- 2.1 In an experiment, two coins are tossed simultaneously.
(A coin toss gives you either heads (denoted by H) or tails (denoted by T).)
- (a) What is the sample space of the two-coin-tossing experiment?
 - (b) What is the event space of the experiment? List all the possible events.
 - (c) Suppose that all the elementary events in the sample space have equal probabilities.
(For example, if there are three possible outcomes in the sample space Ω such that $\Omega = \{x_1, x_2, x_3\}$, then $P(\{x_1\}) = P(\{x_2\}) = P(\{x_3\})$)
 - i. What is the probability of occurrence of each elementary event?
 - ii. What is the probability of the event that at least one head appears?
 - iii. What is the probability of the event that exactly one head appears?
- 2.2 Suppose you roll a dice which has six possible outcomes. You want to define a function that assigns probability values to each event in the event space of the dice-rolling experiment. What are the requirements that this probability assignment must satisfy?