SOA Exam P Study Notes

ActuarialFuy

2026-01-15

Table of contents

About

Part I

Review of Prerequisites

1 Set Theory

A **set** is an *unordered* collection of *distinct* objects, called **member**s or **element**s.

There are several ways to describe a set as illustrated in the following example.

> **Example: Describing Sets**
>
> Consider an experiment of flipping a coin 2 times.
>
> - The set containing all possible outcomes. Denote this set by S:
>
> $$S = \{(h,h),(t,t),(h,t),(t,h)\}$$
>
> where h means 'head' and t means 'tail'. This is the **roster method** in which every element is listed.
>
> - The set containing the number of tails obtained. Denote this set by N. Using the roster method,
>
> $$N = \{0,1,2\}$$
>
> or alternatively, using **set builder** notation,
>
> $$N = \{x \mid x \text{ is a non-negative integer less than or equal to } 2\}$$
>
> or more compactly,
>
> $$N = \{x \in \mathbb{Z}^+ \cup \{0\} \mid x \leq 2\}$$
>
> where obscure symbols will be discussed afterwards.

If an object a is a member of set A, we denote this by $a \in A$. Otherwise, we denote by $a \notin A$. For example, $(h,t) \in S$, $1 \in N$ but $\{1\} \notin N$.

There are some predefined sets, denoted with *blackboard bold* fonts. * $\mathbb{C}$: the set of complex numbers * $\mathbb{R}$: the set of real numbers * $\mathbb{Q}$: the set of rational numbers