1 Sets

The universal set ($\mathcal{U}$) contains everything. The empty set ($\emptyset$) contains nothing.

Some assignments:

$$B_1 = \{1, 3, 5, 7\}, \quad B_2 = \{2, 4, 6, 8\}, \quad B_3 = \{9, 10\}$$

Define:

$$\mathcal{A} = \bigcup_{i=1}^{3}B_i = \{1, \ldots, 10\}$$

The cardinality of a set $\mathcal{S}$ is denoted $|\mathcal{S}|$ and is the number of elements in the set.

$$|B_1| = 4, \quad |B_2| = 4, \quad |B_3| = 2, \quad |B_1 \cup B_2| = 8, \quad |\emptyset| = 0$$

2 Spaces

A number space (denoted $\mathcal{S}$) is characterised by a set of entities with a set of axioms. For example:

$$\mathbb{N} = \{x : x \text{ is positive integer}\}$$
$$\mathbb{Z} = \{x : x \text{ is an integer}\}$$
$$\mathbb{R} = \{x : x \text{ is a real number}\}$$

3 Vectors and Matrices

A matrix (denoted $\mathbf{M}$) is a rectangular array of values. A vector (denoted $\mathbf{v}$) is a column or row of values (that is a one-dimensional matrix).

$$I \mathbf{x} = \mathbf{x}, \quad \mathbf{A}^{-1} = I, \quad x^{-1} = \sum_i x_i$$

Glossary

$I$ the identity matrix. $\mathbb{Z}$ the set of integers.
$M^{-1}$ the inverse of $\mathbf{M}$. $\mathbb{N}$ the set of natural numbers.
$\mathbf{v}$ a vector. $\mathbb{R}$ the set of real numbers.
$\mathbf{1}$ the vector of 1s. $|\mathcal{S}|$ the cardinality of $\mathcal{S}$.
$\sum\sum$ $n$-ary summation. $\emptyset$ the empty set.
$\bigcup\bigcup$ $n$-ary union. $\mathcal{S}$ a set.
$\mathcal{S}$ a number space. $\{x : \ldots\}$ set membership.
$\mathcal{U}$ the universal set. $\{\ldots\}$ set contents.