1 Sets

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

$$\mathcal{B}_1 = \{1, 3, 5, 7\}, \quad \mathcal{B}_2 = \{2, 4, 6, 8\}, \quad \mathcal{B}_3 = \{9, 10\}$$

Define:

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

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

$$|\mathcal{B}_1| = 4, \quad |\mathcal{B}_2| = 4, \quad |\mathcal{B}_3| = 2, \quad |\mathcal{B}_1 \cup \mathcal{B}_2| = 8, \quad |\emptyset| = 0$$

2 Spaces

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

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

Glossary

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