Some notation and definitions used in the course

\((X, Y, A, B, \ldots \text{ are some sets})\)

\(\mathbb{N} = \{1, 2, 3, \ldots\}\)
the set of positive natural numbers

\(\mathbb{Z} = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}\)
the set of integers

\(\mathbb{R}\)
the set of real numbers

\(\mathbb{R}^+ = \{x \in \mathbb{R} : x \geq 0\}\)
the set of non-negative real numbers

\(\mathbb{R}^* = \mathbb{R} \cup \{+\infty, -\infty\}\)
the extended set of real numbers

\(\mathcal{P}(X)\)
the set of all subsets of \(X\)

\(l(I)\)
length of interval \(I \subseteq \mathbb{R}\)

\(A \subseteq B, A \subseteq B\) \(A\) is a subset of \(B\) (not necessarily strict)

\(f(A)\) (for \(f : X \to Y\) and \(A \subseteq X\)) \(\{f(x) \mid x \in A\}\)

\(X \setminus Y\) \(\{x \mid x \in X \text{ and } x \notin Y\}\)

\(Y^c\) \(X \setminus Y\) when \(X\) is clear from the context

For an interval \(I \subseteq \mathbb{R}\) and \(f : I \to \mathbb{R}\), \(f\) is \textit{piecewise continuous} if there are only finitely many points at which \(f\) is discontinuous, and if left and right limits of \(f\) exist at each point of \(I\) (obviously, except one of them at each end points).

\(\sigma\text{-additivity}\) of a function defined on a \(\sigma\)-algebra of subsets of \(\mathbb{R}\) (to \(\mathbb{R}^+ \cup \{\infty\}\)) is the same as its countable additivity.