# Some notation and definitions used in the course

($X, Y, A, B, \ldots$ are some sets)

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| $\mathbb{N} = \{1, 2, 3, \ldots\}$ | 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 $I \subseteq \mathbb{R}$ |

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|---|---|
| $A \subset B$, $A \subseteq B$ | 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 *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).

$\sigma$-*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.