

# Counting theories and hypernatural numbers

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A counting system is a tuple  $(\mathcal{W}, \mathcal{N}, \nu)$  where  $\mathcal{W}$  is a family of sets,  $\mathcal{N}$  is an ordered semiring and  $\nu : \mathcal{W} \rightarrow \mathcal{N}$  is a function which satisfies the following assumptions

$$\nu(A \cup B) = \nu(A) + \nu(B); \quad A \cap B = \emptyset;$$

$$\nu(A \times B) = \nu(A) \cdot \nu(B).$$

We discuss various counting systems and the relations between  $\mathcal{N}$  and  $\mathbb{N}^*$  where  $\mathbb{N}^*$  is a suitable hyperextension of the set of natural numbers  $\mathbb{N}$ .