Exercise 11.8. The set
\[ \{ -\frac{1}{m_1+1}, -\frac{1}{m_2+1}, \ldots, -\frac{1}{m_n+1} \mid n, m_1, m_2, \ldots, m_n \in \mathbb{N} \} \]
is not a well-ordered subset with respect to the natural ordering of \( \mathbb{Q} \): show that the set is dense and is not bounded from below.

Exercise 11.14. Define a function \( f : \{0, 1, \ldots, 9\}^* \to \mathbb{N} \) which is order-preserving with respect to the length-lexicographic ordering \( \ll \): \( v \ll w \iff f(v) < f(w) \). Recall \( 0 \ll 1 \ll \ldots \ll 9 \ll 00 \ll 01 \ll \ldots \ll 99 \ll 000 \ll \ldots \) and \( v \ll w \) if either \( v \) is shorter than \( w \) or \( v, w \) have the same length and \( v <_{\text{lex}} w \).

Exercise 12.7*. Verify the following properties of ordinals.

1. If \( \alpha \) is an ordinal, then \( S(\alpha) \), which is defined as \( \alpha \cup \{\alpha\} \), is also an ordinal.
2. Every element of an ordinal is an ordinal.
3. An ordinal \( \alpha \) is transfinite iff \( |\alpha| = |S(\alpha)| \).
4. An ordinal \( \alpha \) is finite iff \( S(\alpha) = \{0\} \cup \{S(\beta) \mid \beta \in \alpha\} \).

Exercise 12.9. Show that the class \( V_{\text{ord}} \) of all ordinals in \( V \) is not a set.