Exercise 3.2.3. Decide whether the following sets are open, closed, or neither. If a set is not open, find a point in the set for which there is no ϵ-neighborhood contained in the set. If a set is not closed, find a limit point that is not contained in the set.

(a) $\mathbf{Q}$.
(b) $\mathbf{N}$.
(c) $\{x \in \mathbf{R} : x > 0\}$.
(d) $(0, 1] = \{x \in \mathbf{R} : 0 < x \leq 1\}$.
(e) $\{1 + 1/4 + 1/9 + \cdots + 1/n^2 : n \in \mathbf{N}\}$.