1. Prove that $\{(x, y) \in \mathbf{N} \times \mathbf{R}: x y=1\}$ is denumerable.
2. Prove that $(0,1] \cup(2,3] \cup(4,5)$ has cardinality $\mathbf{c}$.

3 . What is the cardinality of $\mathbf{R}-(0,1]$ ? Prove it.
4. Prove that $\mathbf{Q}-\mathbf{Z}$ is denumerable.
5. Prove that if $\overline{\bar{A}} \leq \overline{\bar{B}}$ then $\overline{\overline{\mathscr{P}}(A)} \leq \overline{\overline{\mathscr{P}}(B)}$.
6. Order the following sets in terms of their cardinalities, from smallest to largest. Point out any ties.

- $\mathbf{Q} \cup\{\pi\}$
- $\mathbf{R}-\{\pi\}$
- $\mathscr{P}(\{0,1\})$
- $[0,2]$
- $(0, \infty)$
- Z
- $\mathbf{R}-\mathbf{Z}$
- $\mathscr{P}(\mathbf{R})$

7. Does there exist a one-one function $f: \mathscr{P}(\mathbf{N}) \rightarrow \mathbf{N}$ ? Prove your answer.
