Name:

Due Friday Jan. 23 in class.

1. $(*)$ Read Chapter 1.1.
2. Exercises 1.1.1, 1.1.2, 1.1.5, 1.1.6.
3. Let $\Omega = \mathbb{N}$, and $\mathcal{F}$ be the collection of all subsets A of $\mathbb{N}$ such that either A or A^c is finite. For all $A \in \mathcal{F}$, set $\mathbb{P}(A) = 0$ if A is finite, and $\mathbb{P}(A) = 1$ if A^c is finite.
   (i) Is $\mathcal{F}$ a σ-algebra? or an algebra? or a semi-algebra?
   (ii) Is $(\Omega, \mathcal{F}, \mathbb{P})$ a probability space? If not, can $\mathbb{P}$ be extended to a probability measure on a certain σ-algebra of Ω?
4. Let $a < b$ be real numbers. Express
$$\bigcap_{n=1}^{\infty} \left[a, b + \frac{1}{n}\right]$$
using a single interval. Justify your answer.