1. §2.3: 9.

2. Let $A \subseteq \mathbb{R}$ be a set that is bounded above. Show that the following statements are equivalent.
   
   a) $\beta = \sup(A)$.
   
   b) $\{u \in \mathbb{R} : u \text{ is an upper bound of } A\} = [\beta, \infty)$.

   (Hint: You need to show a) $\rightarrow$ b), and b) $\rightarrow$ a.).

3. Let $\mu > 0$. We define the set
   
   $$A = \left\{ \frac{\mu^n}{n!} \in \mathbb{R} : n \in \mathbb{N} \right\}.$$ 

   Show that $\inf(A) = 0$. (Hint: Use exercise #1 in HW#3.)

4. Let $A = \left\{ \frac{1}{n} - \frac{1}{m} \in \mathbb{R} : n, m \in \mathbb{N} \right\}$. Show $\inf(A) = -1$ and $\sup(A) = 1$.

5. §2.4: 3.

6. §2.4: 5.

7. §2.4: 14.
   
   (Hint: Prove first that $2^n \geq n$, for all $n \in \mathbb{N}$. Use the Archimedean property.)