First Practice Test Addendum

Here is the definition you need for problem 5 on the first practice test:

**Definition.** Let \( f : A \to \mathbb{R} \) be a function. Then \( f \) is *bounded above* if there exists \( k \in \mathbb{R} \) with \( f(x) \leq k \) for all \( x \in A \). Any such \( k \) is an *upper bound* for \( f \). If there is an upper bound \( k \) such that \( k' \geq k \) for all upper bounds \( k' \), then \( k \) is the *least upper bound* (or the *supremum*) for \( f \), denoted by \( k = \sup_{x \in A} f(x) \).

You can also use the fact that \( \sup_{x \in A} f(x) = \sup_{x \in A} f(A) \). I.e., instead of considering the function itself, consider the range \( f(A) \) as a set. Also, the notation \((fg)(x)\) denotes the pointwise product \( f(x)g(x) \).