1. Problems II (page 117), problem 12.

2. Use the formal definition of limit of a sequence to prove that the sequence \( a_n = \frac{1}{n^2} \) has limit equal to zero (that is, \( a_n \) is what the book calls a “null” sequence).

3. Use the (negation of the) formal definition of limit of a sequence to prove that the sequence \( b_n = n^2 \) does not have limit equal to 0 (that is, \( b_n \) is NOT what the book calls a “null” sequence).

4. Problems II (page 118) problem 16 parts ii, iii and v.
   
   \text{(note: you do not need to provide a proof for the surjective/not surjective part of iii. You are expected to prove the rest; you can use properties of powers, exponential and logarithmic functions.)}

5. Problems II, page 118, Problem 20 (i)

6. Let \( f : X \rightarrow Y \) be a function. Prove that
   
   a) \( f \) is injective \( \iff \overline{f} \) is injective
   
   b) \( f \) is injective \( \iff \overline{f} \) is surjective