1) Do problems 10.6, 10.7, 11.2(c), 11.10(b), and 12.10 from the book.

2) Let \( \{s_n\} \) and \( \{t_n\} \) be Cauchy sequences in \( \mathbb{R} \), and let \( \{u_n\} \) be a sequence defined as 
\[ u_n = as_n + bt_n \]
for all \( n \), where \( a, b \in \mathbb{R} \). By using the definition of a Cauchy sequence only, 
without assuming that limits of \( \{s_n\} \) and \( \{t_n\} \) exist, prove that \( \{u_n\} \) is a Cauchy sequence.

3) Let \( \{s_n\} \) be a sequence defined as 
\[ s_n = \begin{cases} 1 + 1/n & \text{if } n \text{ is odd,} \\ -1 & \text{if } n \text{ is even.} \end{cases} \]
Calculate the monotonic sequences 
\[ u_N = \inf \{s_n \mid n > N\}, \quad v_N = \sup \{s_n \mid n > N\} \]
for each \( N \in \mathbb{N} \) and determine \( \lim \inf s_n \) and \( \lim \sup s_n \).

4) Let \( \{s_n\} \) and \( \{t_n\} \) be two sequences in \( \mathbb{R} \). Suppose \( \lim s_n = \infty \), and \( \lim \sup t_n < 0 \). Prove 
that \( \lim(s_n t_n) = -\infty \). Don’t forget to consider the case where \( \lim \sup t_n = -\infty \).

5) How difficult was this homework? How long did it take?