

Assignment #6

Revised: Due Wednesday 30 October, 2013 at the start of class

Please read sections 10, 11, 12, 14, 15, and 16 of the textbook *Elementary Analysis*. Note that we skip section 13 and the part of section 15 about the integral test, but feel free to read that material also. Then do *all* of the following exercises. Turn them in on paper.

In addition, the circled problem on your paper is the one you should also do in L^AT_EX and email to me at `elbueler@alaska.edu`.

Exercise 12.2. (*Hint.* Yes, you may use the result of exercise 8.6(a).)

Exercise 12.12.

Exercise 9.9 (c).

Exercise 12.4.

Exercise 14.1 (a), (b), (e), (f).

Exercise 14.2 (a), (c), (e), (f).

Exercise 14.5.

Exercise 14.6. (*Clarification.* In part (b), replace “Observe” by “Show”.)

Exercise E4. (a) True or false: If (s_n) is a real sequence then there exists $m \in \mathbb{N}$ so that $s_m \leq \limsup s_n$. (*Clarification.* In either case, justify your answer: prove if true, provide counterexample if false.)

(b) Suppose (s_n) is a bounded real sequence. Prove that $\liminf s_n \leq \limsup s_n$. (*Comment.* Both the textbook author and the lecturer have used this fact several times, for instance on the bottom of page 61 and at the end of the proof of Theorem 10.11. But it was never proven.)

Exercise E5. Let $s_n = (-1)^n$ and $t_n = 1 + \sin(\pi n/2)$. Find

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| <p>(a) $\liminf s_n + \liminf t_n$,</p> | <p>(b) $\liminf (s_n + t_n)$,</p> |
| <p>(c) $\liminf s_n + \limsup t_n$,</p> | <p>(d) $\limsup (s_n + t_n)$,</p> |
| <p>(e) $\limsup s_n + \limsup t_n$,</p> | <p>(f) $\liminf (s_n t_n)$,</p> |
| <p>(g) $\limsup (s_n t_n)$</p> | |

(*Hint.* This problem is just like 12.3, except that the answers to 12.3 are in the back of the book.)