

**MATH 241: ANALYSIS IN SEVERAL REAL VARIABLES I**  
**WORKSHEET, DAY #11**

**Problem 1.** Give an example of each of the following sequences or give a proof that such a sequence cannot exist.

(a) A sequence  $(a_n)$  such that  $a_n \notin \{0, 1\}$  for all  $n$  but  $(a_n)$  contains subsequences converging to 0 and 1.

(b) An unbounded sequence with a convergent subsequence.

(c) A monotone sequence that diverges but has a convergent subsequence.

**Problem 2.** Show that the sequence

$$\sqrt{2}, \sqrt{2\sqrt{2}}, \sqrt{2\sqrt{2\sqrt{2}}}, \dots$$

converges and find the limit.