MATH 431/531 FALL 2016
HOMEWORK 9
DUE NOVEMBER 23, 2016.

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Problems:

(1) Prove Lee, Theorems 4.46 and 4.47.
(2) Lee, Exercise 4.70.
(3) Lee, Problem 4-23.
(4) Lee, Problem 4-27.
(5) Lee, Problem 4-29.
(6) Lee, Problem 4-32.

Challenge problems (required for Math 531, optional for 431):

(7) Let X be a topological space. An *end* of X is a function f from $\{\text{compact subsets of } X\}$ to $\{\text{subsets of } X\}$ with the following properties:
  (a) For each compact $K \subset X$, $f(K)$ is a connected component of $X \setminus K$.
  (b) If $K \subset L$ then $f(L) \subset f(K)$.

  Prove that $\mathbb{R}$ has two ends and $\mathbb{R}^n$ has one end for $n > 1$. Give an example of a subspace of $\mathbb{R}^n$ with infinitely many ends, and prove your subspace has infinitely many ends.

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