Math 315
Homework #5
4/21/2017

# Abbott: 2.3.1, 2.3.9

**2.3.1** Let $x_n \geq 0$ for all $n \in \mathbb{N}$.

(a) If $(x_n) \to 0$, show that $(\sqrt{x_n}) \to 0$.

(b) If $(x_n) \to x$, show that $(\sqrt{x_n}) \to \sqrt{x}$.

**2.3.9**

(a) Let $(a_n)$ be a bounded (not necessarily convergent) sequence, and assume $\lim b_n = 0$. Show that $\lim(a_n b_n) = 0$. Why are we not allowed to use the Algebraic Limit Theorem to prove this?

(b) Can we conclude anything about the convergence of $(a_n b_n)$ if we assume that $(b_n)$ converges to some nonzero limit $b$?

(c) Use (a) to prove Theorem 2.3.3, part (iii), for the case when $a = 0$.