Homework Three, due Monday, September 14.

1. In the proof of Proposition 1.6 on page 7 of The real numbers it is left to the reader to verify that “A is a Dedekind cut”. Do so.

2. Prove Theorem 1.11 on page 8 of The real numbers.

3. Suppose $a$ and $b$ are sequences of real numbers with limits $L$ and $M$, respectively. Show that
\[ \lim_{n \to \infty} a_n + b_n = L + M \quad \text{and that} \quad \lim_{n \to \infty} a_n b_n = LM. \]
You may assume that $L$ and $M$ are finite.

4. Prove (i) and (ii) of Proposition 2.1 on page 11 of The real numbers.

5. Prove (i) and (ii) of Proposition 2.2 on page 11 of The real numbers.

6. Prove Theorem 1.4 on page 4 of The real numbers.

7. Do Exercise 2.2 on page 12 of The real numbers.

8. Do Exercise 2.3 on page 12 of The real numbers.

9. Do Exercise 2.4 on page 12 of The real numbers.