Abbott, section 1.3, problems 2, 3(a), 8, and 9. (For problem 3(a), add the stipulation that $A$ is non-empty.)

Abbott, section 1.4, problem 5.

Extra problem A: Return to the sequence defined in problem 1.2.10, and find (with proof) the supremum of $\{y_n : n \in \mathbb{N}\}$.

Extra problem B: Give a different proof of Theorem 1.4.1 by taking $x = \inf B$ with $B = \{b_n : n \in \mathbb{N}\}$.

Extra problem C: Show that the set $\{r\sqrt{2} : r \in \mathbb{Q}\}$ is dense in $\mathbb{R}$.

Extra problem D: For each $n \in \mathbb{N}$, assume we are given rational numbers $a_n \leq b_n$, so that $J_n = \{x \in \mathbb{Q} : a_n \leq x \leq b_n\}$ is non-empty. Assume also that each $J_n$ contains $J_{n+1}$, so that $J_1 \supseteq J_2 \supseteq J_3 \supseteq \ldots$. Must it be the case that the intersection $\bigcap_{n=1}^{\infty} J_n$ is non-empty? (Of course you must prove your answer!)

Please don’t forget to write down who you worked on the assignment with (if nobody, then write “I worked alone”), and record how much time you spent on each problem (this doesn’t need to be exact) on the time-sheets I’ll give out in class on Sept. 10.