- 1. Carothers 1.4
- **2.** Carothers 1.11
- **3.** Carothers 1.15
- **4.** Carothers 1.21
- **5.** Carothers 1.24
- **6.** Suppose $\limsup_{n\to\infty} x_n = -\infty$, as defined in terms of eventual upper bounds. Show that

$$\overline{\lim}_{n\to\infty}x_n=-\infty,$$

as defined in the text.

- 7. Let (r_n) be an enumeration of $\mathbb{Q} \cap [0, 1]$. Show that $\limsup n \to \infty = 1$.
- **8.** Prove that

$$\limsup x_n + \liminf y_n \le \limsup (x_n + y_n) \le \limsup x_n + \limsup y_n$$

so long as neither of the right- or left-hand sides are of the form $\infty - \infty$.

9. Carothers 1.36