

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

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

as defined in the text.

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

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

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

9. Carothers 1.36