Q1* Let $x_0 \in \mathbb{R}$, $\xi \in \mathbb{R} \cup \{\pm\infty\} = [-\infty, \infty]$ and $f: \mathbb{R} \setminus \{x_0\} \to \mathbb{R}$. Show that

$$\lim_{x \to x_0} f(x) = \xi \iff \lim_{x \to x_0 -} f(x) = \xi = \lim_{x \to x_0 +} f(x)$$

and hence that $\lim_{x \to x_0} f(x)$ not exist in $[-\infty, \infty]$ if $\lim_{x \to x_0 -} f(x) \neq \lim_{x \to x_0 +} f(x)$.

Q2* = q10(b) of Bartle § 4.1

Q3 = q14
Q4* = q15
Q5 = q16
} of Bartle § 4.1.

Q6* = q1(b)
Q7* = q2(d).
Q8* (cf. q3)
} of Bartle § 4.2

Use the computation rules to calculate

$$\lim_{x \to 0} \frac{\sqrt{1+2x} - \sqrt{1+3x}}{x + 2x^2} = \frac{-1}{2}$$

(Quite difficult to check with ε-δ ! — not required at this time).