Problems - 3.6

(4) Decide if the given sequence is a Cauchy sequence. If it is, prove it. If it is not, a subsequence which is a Cauchy sequence.

$$x_n = 1 + (-1)^n + \frac{1}{n}$$

(7) Suppose that $s_n = \sum_{j=1}^{n} u_j$ and $S_n = \sum_{j=1}^{n} |u_j|$ for $n \in \mathbb{N}$. Assume $\lim_{n\to\infty} S_n = S$. Show that s_n converges as n goes to infinity.

(9) Suppose that f has a domain which contains interval $I = (a, b)$, and suppose that $\lim_{x\to b^-} f(x) = L$. Prove that for each $\epsilon > 0$, there is a $\delta > 0$ such that $b - \delta < x, y < b$ implies $|f(x) - f(y)| < \epsilon$. (Note: You are proving one direction of Th. 3.14 for one-sided limits.)