

Homework for Math 351-003

Individual Homework: Due Wednesday, January 31

1. Prove that if (t_n) is a bounded sequence and (s_n) converges to 0, then $(s_n t_n)$ converges to 0. (Note that you should not assume that (t_n) converges!)
2. Prove that if (x_n) converges to $x \neq 0$ and x_n is non-zero for all n , then $(\frac{1}{x_n})$ converges to $\frac{1}{x}$. (Hint: $\left| \frac{1}{x_n} - \frac{1}{x} \right| = \frac{|x_n - x|}{|x_n \cdot x|}$.)
3. Prove that if (x_n) converges to 0 and $x_n > 0$ for all n , then $\frac{1}{x_n}$ diverges to infinity.
4. Prove that if (a_n) is bounded and $\lim_{n \rightarrow \infty} b_n = +\infty$, then $\lim_{n \rightarrow \infty} (a_n + b_n) = +\infty$.