Question 1. *Show that* $f = o(1)$ *as* $x \to a$ *if and only if* $f(x) \to 0$ *as* $x \to a$.

Solution. Recall that $f(x) = o(g(x))$ as $x \to a$ iff for any $\varepsilon > 0$ there is $\delta > 0$, such that $|f(x)| \leq \varepsilon |g(x)|$ for all x with $0 < |x - a| < \delta$. Use this definition in the case when $g(x) \equiv 1$ and obtain that for any $\varepsilon > 0$ there is $\delta > 0$ such that $|f(x)| \leq \varepsilon$ for all x, such that $0 < |x - a| < \delta$. By definition of the limit of a function this is the same as $\lim\limits_{x \to a} f(x) = 0$. □