1. For $x \in [0, 1]$ and $n \in \mathbb{N}$, define $f_n(x) = \frac{nx^2}{1+nx}$. Show that $f_n$ converges pointwise to a continuous function. Is the convergence uniform?

2. Let $\psi: \mathbb{R} \to \mathbb{R}$ be a function which is $\geq 0$, is equal to 0 outside $[-1, 1]$, and satisfies $\int_{-1}^{1} \psi(x) \, dx = 1$. Define $f_n(x) = n\psi(nx)$. Show that $f_n \to u$ on $\mathbb{R} \setminus (-\delta, \delta)$ for any $\delta > 0$, but that $\int_{-1}^{1} f_n(x) \, dx = 1$ for all $n$.