1. Show that for all $L \in \mathbb{R}$, $\dfrac{L^n}{n!} \to 0$.

2. Show that if $f(x)$ is differentiable on $\mathbb{R}$ and for all $x \in \mathbb{R}$, $f'(x) = f(x)$ and $f(0) = 1$ then $f(x) = \exp(x)$.

3. Let $0 < L < 1$ and $f_n(x) = \displaystyle\sum_{k=0}^{n} x^k$. Show that f_n converges uniformly to some f on $[-L, L]$.