1. Show that if $f : \mathbb{R} \to \mathbb{R}$ is uniformly continuous and $f_n(x) := f\left(x + \frac{1}{n}\right)$ then $f_n \to f$ uniformly.

2. Is the statement of the previous problem true if $f$ continuous but not uniformly continuous?

3. Find the largest domain on which the function series $\sum_{n=1}^{\infty} \frac{n}{n+1} \left(\frac{x}{2n+1}\right)^n$ is convergent.