1. Let $F \subseteq C([0, 1])$ be a collection of functions, each of which is differentiable and has $|\text{derivative}|$ bounded by one and the same $K$. Prove that $F$ is equicontinuous.

2. Let $X$ be a compact metric space and $F \subseteq C(X)$ an equicontinuous family of functions. Prove that if $F$ is pointwise bounded then $F$ is uniformly bounded.

3. Let $a$ be a point of the bounded interval $I$. Let $(f_n)_{n=0}^\infty$ be a sequence of continuously differentiable functions $I \to \mathbb{R}$ such that (i) the sequence $(f_n(a))_{n=0}^\infty$ is convergent and (ii) the sequence $(f'_n)_{n=0}^\infty$ converges uniformly on $I$ to a function $g$. Prove that $(f_n)_{n=0}^\infty$ converges uniformly on $I$ to a function $f$ such that $f' = g$.

[Notice that if $t \in I$ then (why?) $f_n(t) = f_n(a) + \int_a^t f'_n$]