Math 3040 HW 6 - Due Nov. 1, 2019

1. Let $f : \mathbb{N} \to \mathbb{N}$ be a function such that $f(n+1) > f(n)$ for all $n \in \mathbb{N}$. Prove that if $\lim_{n\to\infty} x_n = L$, then $\lim_{n\to\infty} x_{f(n)} = L$.
2. Let (x_n) be a sequence in $\mathbb{R}$. Suppose $\lim_{n\to\infty} x_{2n} = L$ and $\lim_{n\to\infty} x_{2n+1} = L$. Prove or provide a counterexample: $\lim_{n\to\infty} x_n = L$.
3. Prove Proposition 10.21 (ii) of TAP.
4. Prove Proposition 10.23 (v) of TAP.