EXTRA HWK

1) True or false

    a) If $\{a_n\} \to a$ and $\{b_n\} \to b$ and $a < b$ then there exists $N \in \mathbb{N}$ such that $n \geq N$ implies $a_n < b_n$

    b) If $\{a_n\} \to a$ and $\{b_n\} \to b$ and $a \leq b$ then there exists $N \in \mathbb{N}$ such that $n \geq N$ implies $a_n \leq b_n$

    c) If S is a bounded set of real numbers that contains its Sup and Inf, then S is a closed interval.

2) Let $x_n = \frac{1}{n+1} + \frac{1}{n+2} + \cdots + \frac{1}{2n}$. Prove the limit of $\{x_n\}$ exists using monotone convergence.

3) Use montone convergence to prove the following converge and then find the limit using that a subsequence must converege to the same limit.

    a) $s_1 = 1$ and $s_n = \frac{1}{4}(s_{n-1} + 5)$ for $n \geq 2$

    b) $s_1 = 2$ and $s_n = \frac{1}{4}(s_{n-1} + 5)$ for $n \geq 2$