Geometric basics. Recall that in class we introduced the geometric view for binary search tree execution. Using only this view, prove that for any set of $m$ queries on $n$ items, there is a BST that will answer the queries in total time $O(m \lg n)$. You should reason only about point sets, not about BSTs.

Working-set is harder. In class we introduced the entropy bound and the working-set property for BSTs. The entropy bound holds if all searches in the BST have amortized time $O(\sum_{k=1}^{n} p_k \lg \frac{1}{p_k})$, where $p_k$ is the fraction of the time that key $k$ is queried. The working-set property holds if the time to search for an element $x_i$ is $O(\lg t_i)$, where $t_i$ is the number of elements queried since the last access to $x_i$. Prove that any BST with the working-set property also has the entropy bound.