Instructions You can write your solutions either in English or French. Please observe the homework policy as described in the course web page.

Consider the paging problem, as described in class, with $k$ being the cache size, and $N$ the total number of pages ($k \leq N$).

For a fixed $l \in \mathbb{N}^+$, define by $S_l$ the set of all request sequences of size $l$, consisting of pages in the set $\{1, \ldots, N\}$ (i.e., there are $N^l$ sequences in this set). We say that a deterministic algorithm $A$ is no worse than algorithm $B$ if there exists a bijection $\pi : S_l \to S_l$ such that $A(\sigma) \leq B(\pi(\sigma))$, for all $\sigma \in S_l$. In other words, $A$ on $\sigma$ does not incur larger cost than $B$ on $\pi(\sigma)$, for any $\sigma \in S_l$.

(a) Let $A$, $B$ be two deterministic paging algorithms that both have the property that they only evict a page when a cache miss occurs. Show that $A$ is no worse than algorithm $B$ (which also implies the opposite), for any given $l$.

(b) Explain what this result means, at an intuitive level. Does it imply anything about our ability to distinguish between “good” and “bad” paging algorithms?