COS 511: Theoretical Machine Learning

Hint on HW#5, problem 1c — Spring, 2019

Follow the relevant steps of the double-sample proof given in lectures 5 and 6 which involved randomly swapping examples between S and S'.

You can specifically use (without proof) the following abstract version of one of the steps that was proved in class. Let $U = \langle u_1, \ldots, u_m \rangle$ and $U' = \langle u'_1, \ldots, u'_m \rangle$ be any two sequences of bits (0's and 1's), and let $k > 0$. Suppose, for $i = 1, \ldots, m$, we swap u_i and u'_i with probability $1/2$, and otherwise leave that pair alone. Call the resulting sequences V and V'. Then the probability (over the random swaps) that the number of 1's appearing in V' is at least k, but no 1's at all appear in V is at most 2^{-k}.