Quiz 2

True and Flase questions: Answer True or False to each question below. Answer true only if it is true as stated with no additional assumptions. Adding a short explanation will give you partial credit even if your answer is wrong. All questions have equal points. Other questions give on line answer.

First provide your Name and ID *

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Given N! = 1*2*3* ... *N Take log T(N) = log(N!) and prove T(N) in O(N log N) *

T(N) = log(N!) = log(1) + log(2) + ...+ log(N) has N-term smaller than N log(N) the sum of the last one..QED.

True/False: Sum^N_(i= 1) i^k in O(N^k)

False. The sum of power as explained in class is O(N^(k+1). Even try case k = 0 which give N.

True/False: Given T(N) = 2 T(N/2) + 1/N implies T(N) = O(N)

True by Master equation first term on RHS work for T(N) = c N and 1/N is negligible

True/False: Sum^N_{i=1} N/i in O(N)

False: Sum^N_{i=1} N/i = N Sum^N_{i=1}1/i = O(N logN) -- See sum of 1/i in class slides..

True/False: Given an array of positive N integers a[k] with k = 1,2,...,N Sorting a[k] in ascending order maximizes Sum_k (k a[k])

True. Consider two terms at k_small < k_large and two values a_small < a_large. A little algebra shows that k_small a_small + k_large a_large > k_small a_large + k_large a_small. (See class slides!) So swapping into sorted order always make the sum larger. Q.E.D