

Return to problem of sorting
 n comparable elements with
a comparison based alg.

As adversary what should I
put in list L ?

$$\# \text{ comparisons} \geq \lceil \log_2 n! \rceil$$

Ex) $a_0 a_1 a_2$ $n=3$

from
alg

$a_0 > a_1 ?$

yes

no ~~1, 2, 3~~

no ~~2, 3, 1~~

yes 3, 1, 2

yes 2, 1, 3

no ~~1, 3, 2~~

yes
cant
have both $[3, 2, 1]$
 $[10, 8, 5]$

these are all
different permutations

What alg will output
is something like

$$a_1 < a_2 < a_0$$

In general L begins with $n!$ inputs (one for each permutation)

Adv strategy: Answer each comparison based on majority in L

Stirling's approx

$$n! \geq (n/e)^n$$

euler's constant

$$\# \text{ comp} \geq \lceil \log_2 (n/e)^n \rceil$$

$$= \lceil n (\log_2 n - \log_2 e) \rceil$$

$$= \lceil n \log_2 n - n \log_2 e \rceil = \Omega(n \log n)$$