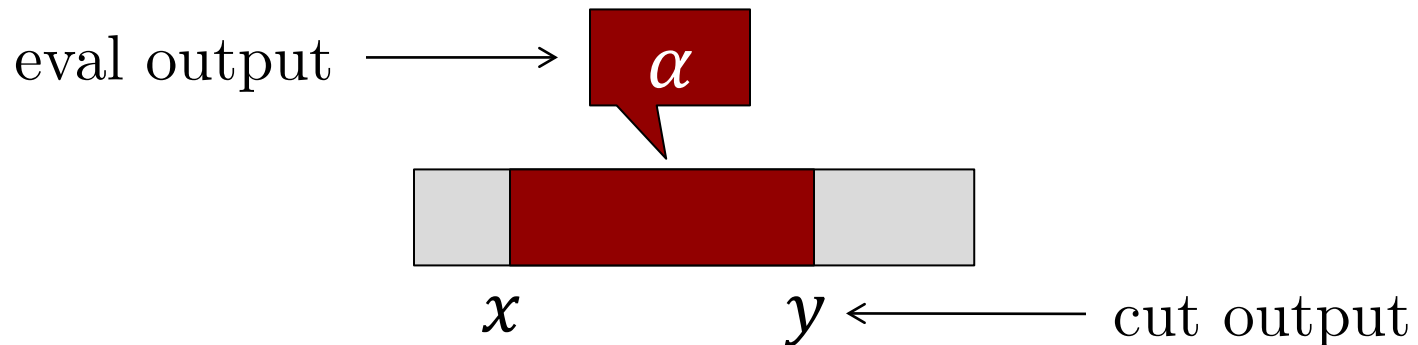# CMU 15-896

Fair division 2: Complexity

Teacher:
Ariel Procaccia

Reminder: the RW model

- Input size is n
- Two types of queries
  - $\text{Eval}_i(x, y)$ returns $V_i([x, y])$
  - $\text{Cut}_i(x, \alpha)$ returns y such that $V_i([x, y]) = \alpha$

eval output $\longrightarrow$ α

x $\qquad$ y $\longleftarrow$ cut output

Complexity of proportionality

- The Even-Paz protocol is proportional; its complexity in the RW model is $O(n \log n)$

- Theorem [Edmonds and Pruhs 2006]: Any proportional protocol needs $\Omega(n \log n)$ operations in the RW model

- Proof:

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