



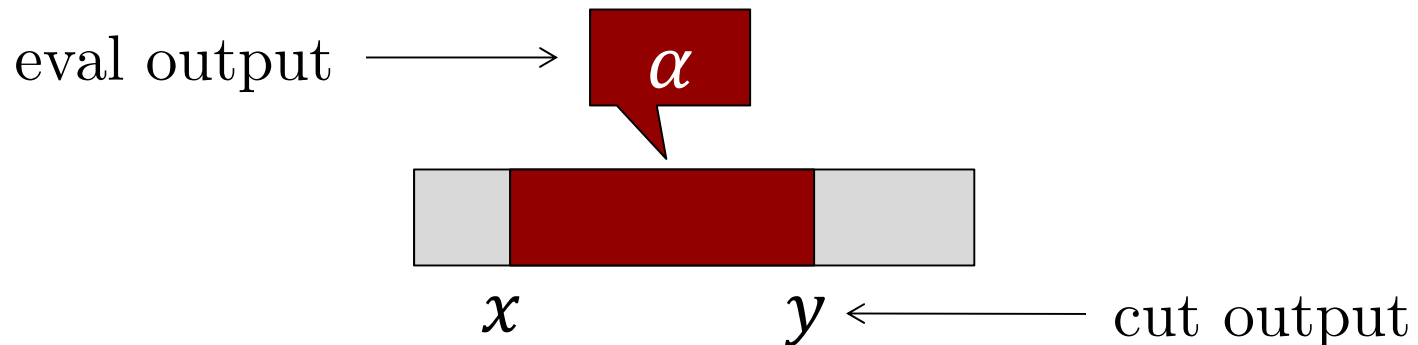
**CMU 15-896**

**FAIR DIVISION 2:  
COMPLEXITY**

**TEACHER:  
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# 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  $V_i([x, y]) = \alpha$



# 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:**

