Project

Dates

- Classes end 12/13, wednesday
- Final homework due 12/12, tuesday
- Project due 12/8 (MIT restriction)

Options

- Reading project
  - Read some **hard** papers
  - Write about them *more clearly* than original
  - graded on delta
  - best source: STOC/FOCS/SODA
- Implementation project
  - read some randomized algorithms papers,
  - implement
  - develop interesting test sets
  - identify hard cases
  - devise heuristics to improve
- In your work:
  - use a randomized algorithm in your research;
  - write about it

MST

Review Background

- kruskal
- boruvka
- verification

sampling theorem:

- Heavy edges
- pick F with probability p

- get n/p F-heavy edges

Recursive algorithm without boruvka:

$$T(m,n) = T(m/2,n) + O(m) + T(2n,n) = O(m + n\log n)$$

(sloppy on expectation on T(2n,n))
Recursive algorithm with 3 boruvka steps:

$$\begin{aligned} T(m,n) &= T(m/2,n/8) + c_1(m+n) + T(n/4,n/8) \\ &\leq c(m/2+n/8) + c_1(m+n) + c(n/4+n/8) \\ &= (c/2+c_1)m + (c/8+c_1+c/4+c/8)n \\ &= (c/2+c_1)(m+n) \end{aligned}$$

so set $c = 2c_1$ (not sloppy expectation).
Notes:

- Chazelle $m\log\alpha(m,n)$ via relaxed heap
- Ramachandran optimal deterministic algorithm (runtime unknown)
- open questions.