Before Class:

- Journal Up

1. Simple Minimum and Maximum
   - How do you find the minimum in an unsorted array?
   - Maximum? Any faster?
   - Minimum always the same as the maximum?
   - Any other ways to find the minimum?
   - Minimum and maximum at the same time?
   - Faster?
   - How do you find the second smallest?
   - kth smallest?

2. kth in Linear Expected Time
   - Use randomized partition from Quicksort
   - Explain algorithm
   - Sounds like quicksort: why not $\Theta(n \log n)$?
   - Shooting for $E[T(n)]$
   - Indicator Random: if first subarray has $k$ elements ($1/n$)
   - $T(n) \leq \sum_{k=1}^{n} X_k \cdot T(max(k-1), n-k) + O(n)$
   - Simplify, Induction

3. Linear Worst-case Time
   - Divide into $\lceil n/2 \rceil$ groups of five elements each
   - Find the median of each group using insertion sort
   - Use SELECT to find median-of-medians
   - Partition around median-of-medians
   - Use Select recursively until a median-of-medians is $i$th
   - num greater is $3 \left( \left\lceil \frac{1}{2} \left\lceil \frac{n}{5} \right\rceil \right\rceil - 2 \right) \geq \frac{3n}{10} - 6$
   - $T(n) \leq T(\left\lfloor n/5 \right\rfloor) + T(7n/10 + 6) + O(n)$

Next Class:

- Graphs - some old, some new
- Evaluations!