MA/CSSE 473 Day 18 Some "left-over" divide and conquer algorithms:

1. Fake Coin problem: How many weighings are necessary to find the lighter coin (assume there is exactly one lighter coin) if we use a decrease by a factor of 2 strategy?

2. Median-finding (use a quicksort-like partition, often called quickselect)

3. Explain the winning strategy for two-player one-pile Nim where a player can take `1..m` chips on one turn, and the winner is the player who takes to take the last chip.

4. What is the winning strategy for 2-pile Nim? Each player can take any nonzero number of chips *from either of the piles*.

A strategy for n-pile Nim.

5. Define x ⊕ y, the "Nim sum" of x and y. (note that ⊕ is associative and commutative)

6. What is 11 ⊕14? _____

7. Notation for x_i, y_i, s, and t:

8. Lemma 1 and its proof

9. Lemma 2 and its proof

10. Lemma 3 and its proof

11. Briefly describe the Josephus problem