Before Class:

- *Journal Up*

1. Disjoint Data Sets

- Minimum Spanning Tree Example
- Set of sets of \( n \) items
- Each item only in one set (Disjoint!)
- Representative elements
- Operations: Make-Set, Union, Find-Set
- For find, assume that we have pointer to object!
- \( n \) = number of items, \( m \) = number of ops
- What is the maximum number of Make-Sets?
- What is the maximum number of Unions?
- MST example from ground up

2. Linked List Representation

- Put items in a set of linked lists
- Time for each operation (amortized time today!)
- Need Representative pointers
- Need Tail Pointers
- \( \Theta(n) \)? Can we do better?
- Only change the head pointers of the smallest list
- (Weighted Union)
- Analysis

3. Tree/Forest Representation

- Define Up-trees, suggest a forest as a data structure
- Does order of children matter?
- Without any more definition, you get a linked list
- Even then, how fast is a find-set?
- Two heuristics can help running time.
- Maintain Rank (upper bound on height of tree)
- Union by Rank
- Path Compression
- Ackerman’s Function (\( \leq 4 \))

Next Class:

- *Quiz!*
- *Return Homework 4*
- *Evaluations!*