Recurring Section 5

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Announcements

- The feedback form will now be mandatory to be marked as present for attendance to encourage you to fill it out (for each section, the form for the previous one must be submitted).
  - Feedback Form: https://forms.gle/anpxMKNFThCtYLz56
- Asymptotics has begun today, and I'll very briefly talk about it, but since it's not on the worksheet we'll go into more depth later on.

Content Review

Iterables/Iterators

- The iterable method produces a new iterator.
- An iterator is the object maintains iteration state.
  - This means it has a pointer to the current element, a method hasNext(), and a method next().

Comparables/Comparators

- Comparable is an interface that has a compareTo method taking another object of the same type to represent which comes first.
  - This uses a “natural order” implied by the compareTo method, such as the age attribute of a Dog object.
- Say we want to order by name instead. We then use the Comparator interface, which implements a compare method which takes in two objects and compares the first to the second, returning similar values but now specifying something else.
- Comparable requires modifying the source class; comparator does not. We can also use multiple different comparison strategies with different comparators, but comparable has one natural ordering.

Thinking About Asymptotics

- This involves looking at the function as the input grows in size.
- For example, say a method multiplied every element in an array by 2. That would take linear time.
  - Independent of how efficient every multiplication is, since as the input grows in size the method operations grows linearly with it.
- Computing the actual value is similar to calculus – constants and lower growth terms get dropped.
- For iteration, think of it with regards to the number of iterations and the work done per iteration; recursion can be drawn as a tree with levels and nodes representing the work done.

Why Data Structures Are Important

- Data structures like the weighted quick union from lecture are going to be very integral towards understanding both more advanced data structures and algorithms themselves.
- Algorithm runtime can depend on the choice of data structure used (will be more relevant for the final).
- In the real world, data structure choice has quite significant impacts on the end user of any product.