Recursion

Technical definition:

The process in which a function calls itself directly or indirectly is called recursion and the corresponding function is called a recursive function.

Not so technical definitions:

- You can probably use recursion anytime you can iterate over something

- It can be confusing at first, but in many cases it can greatly simplify a problem.

- To understand recursion, you must first understand recursion.

Many (but not all) recursive functions have the following pattern:

```
const recurse = (dataStructure, action) => {

  // Check for base case
  if(basecase === satisfied){ return; }

  // Perform some action to the currently visited node
  datastructure.modify(action);

  // Call the same function with a reduced version of the datastructure
  recurse(datastructure.next, action);
}
```

Performing an action to the currently visited node could actually go in a few different places in the function. For example, appending an item to a list would use the base case conditional to modify the list

We could even rewrite some of our LinkedList functions using recursion:

Without recursion:

```
const Queue = () => {
  return {
    queue: null,
    enqueue(val) {
```

```
      let node = Node(val);

      if(this.queue === null){
        this.queue = node;
        return;
      }
      let curr = this.queue;
      while(curr.next !== null){
        curr = curr.next;
      }
      curr.next = node;
    },
  },
};
```

With recursion:

```
const Queue = () => {
  queue: null,
  enqueue(queue, val) {
      // Base case
      if(queue.next === null){
        queue.next = Node(val);
        return;
      }
      // Call the same function with a reduced version of the queue
      this.enqueue(queue.next, val);
    },
};
```

Note: The recursive version of `enqueue()` would need to be called like so:

```
let q = Queue();
q.recursiveEnqueue(q.queue, 8);
```

Questions:

What happens in memory when we call a recursive function?

What are the pros/cons to using recursion over iteration?

Using recursion, implement the following functions for an array:

- print the array

- get the length of the array