finalquestions.md

Iteration & Accumulation Practice Problems/Study Guide

1. *Basic Problems* Sequences to Non-Sequence Types
    - *Classic Patterns* Sum,Count,Search,Min/Max,Average
    - *Examples*
        - Count vowels/consonants/specific-letters in a string
        - Total length of list of strings
        - Number of strings of a given length or in a length range
        - Shortest/Longest string in a list of strings
        - Location of shortest/longest string in a list
        - Is there a rect of a given area?
        - Is there a rect within a given region?
        - First Rect (Rect or Location of Rect) in a list of Rects with area within a given range
        - Last Rect (Rect or Location of Rect) in a list of Rects with area within a given range
2. *Map-Style Problems* Sequences to Sequences. 1-to-1 Transformation.
    - *In-Place* Replace list contents with new, transformed values
    - *Functional* Return the transformed list. Do not modify the list argument.
    - *Examples*
        - List of strings to list of lengths of the strings
        - Double/triple/raise to a power all the numbers in a list
        - Grow or shrink Rect length/width/both by a factor (double, triple, 1.5, etc.)
        - Fizzbuzz style problems: multi-conditional transformation.
            - Multiples of 3 -> Fizz, Multiples of 5 -> Buzz, Multiples of 3 and 5 -> Fizzbuzz, otherwise do nothing.
            - Double integers between 1 and 10, Divide by 2 integers between 10 and 20, Triple integers between 30 and 40, etc.
            - Strings length less than 3 to "short", between 3 and 6 "average", more than 6 "long".
3. *Filter-Style Problems* Sequence to Sequence. Keep/Remove based on a condition.
    - *Note* Basic search and problems have natural filter counterparts (collect the stuff rather than find/count).
    - *Note* Filters can either collect values or they can collect locations of values. Be ready for both!
    - *Examples*
        - Remove/keep all numbers within/outside a range
        - Remove/keep odd integers
        - Remove strings based on length
        - Remove strings that start/end with a given letter
        - Starting with a string, get a list of all the vowels/consonants.
        - Remove rectangles based on area (too small, too big)

        - Remove rectangles based on location (inside or outside a region)
        - Remove rectangles that are colliding with a specific rectangle

4. *Parallel Traversals* Working two sequences in parallel
    - *Examples*
        - Given list of Rects (locations) and list of Vectors (velocity), move all the rectangles according to the velocity.
        - Weighted Average: Given list of numbers and list of weights (floats between 0 and 1 that add to 1), multiple values with associated weights and compute the sum.
5. *Challenge Problems*
    - Filter+Map Combos (Remove some, transform the rest)
    - Determine if any two rectangles in a list are colliding
    - Determine if a string/number in a list is repeated
    - Prefix sum: Make location i be the sum of all the values preceding it.
    - Palindrome Detection: Does the sequence read the same both forwards and backwards.