

Week 14: Problems

CS 5301
Fall 2018

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Problem solving

- Understand the problem description
- Generate a hypothetical solution
 - Think in terms of steps computer must perform
- Encode the solution (write the C++ code)
- Check your work
 - Trace your code, go through it step by step, carry out the instructions to see if they will solve the problem (you must be able to read code)
 - Look for errors in your solution (incorrect syntax, missing or misplaced { }, undefined variables, etc).

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Practice Problem #1

- Problem: write a function that will return true if all of the elements in an array are equal to 0.
- How to think about this problem:
 - ALL of them must be 0 to be true. I have to look at ALL of them before I can return true.
 - If any one of them is not 0, it is false. I need ONE bad example to return false.

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Practice Problem #2

- Write a function max that computes the maximum value in an integer array a[] of size N.
- Rewrite the function so that it uses recursion to find the maximum value. (Hint: maximum is not defined for an empty list, so use the list of size 1 as the base case).

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Practice Problems #3

Write a function `RemoveFirst()` that removes the first occurrence of a given value `x` from an array `a[]` of size `N`. It is not known whether the value actually occurs in the array. It should shift the elements after the one removed to close the gap.

For example, if `a = {2,4,5,6,4,7,2,3,4,2}` then `RemoveFirst(a,10,4)` produces `a = {2,5,6,4,7,2,3,4,2}`

The prototype for the function is:

```
void RemoveFirst(int a[], int &N, int x)
```

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Practice Problems #4

- Write a **recursive** function `SumUp()` that returns the sum of the values in a singly linked list. For example `SumUp (L)` for to the list `L: 3,5,4,2,5,7` returns 26. Assume these declarations:

```
struct node {
    int data;
    node *next;
};
int SumUp( node* L );
// returns the sum of the values in L
```

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Practice Problems #5

- Write a function **mode** that returns the most commonly occurring element in an array of ints. For example `mode (L)` applied to the array `L: 3,5,4,2,5,7` returns 5. If `L = {1,2,3,3,4,3,5,2}` it returns 3. You may assume there is only one mode in the array.

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