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).

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.

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).
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)

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
```

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.