# Experiment-1.4

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**Aim** – To demonstrate the concept of Hashing

## Objective-

* The objective is to build problem solving capability and to learn the basic concepts of data structures.
* The implementation of Last Stone Weight which shows and brushes up the concept of Heap and can be solved through various approaches.
* The implementation of Cheapest flights with shops which is heap by default in C++.

## Missing Number

<https://leetcode.com/problems/missing-number/>

**Code –**

class Solution {

public:

int missingNumber(vector<int>& nums) {

int sum=0;

for(int i=0;i<=nums.size();i++){

sum+=i;

}

for(int i=0;i<nums.size();i++){

sum-=nums[i];

}

return sum;

}

};

## Output -

1. **Longest Duplicate Substring**

<https://leetcode.com/problems/longest-duplicate-substring/>

**Code -**

class Solution

{

public:

    string longestDupSubstring(string s)

    {

        unordered\_map<char, vector<int>> hash;

        int n = s.length();

        for (int i = 0; i < n; i++)

            hash[s[i]].push\_back(i);

        int Max = 0, index = -1;

        for (int i = 0; i < n; i++)

        {

            char f = s[i];

            hash[f].erase(hash[f].begin());

            for (int it : hash[f])

            {

                int j = 0;

                while (i + j < n and it + j < n and s[i + j] == s[it + j])

                    j++;

                if (j > Max)

                {

                    Max = j;

                    index = i;

                }

                if (Max == n - i - 1)

                    return s.substr(index, Max);

            }

        }

        if (Max == 0)

            return "";

        else

            return s.substr(index, Max);

    }};

## Output –