Experiment1.4

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Aim: https://leetcode.com/problems/word-pattern/

WORD PATTERN

Given a pattern and a string s, find if s follows the same pattern.

Here follow means a full match, such that there is a bijection between a letter in pattern and a non-empty word in s.

Example 1:

```
Input: pattern = "abba", s = "dog cat cat dog"
Output: true
```

Example 2:

```
Input: pattern = "abba", s = "dog cat cat fish"
Output: false
```

CODE:

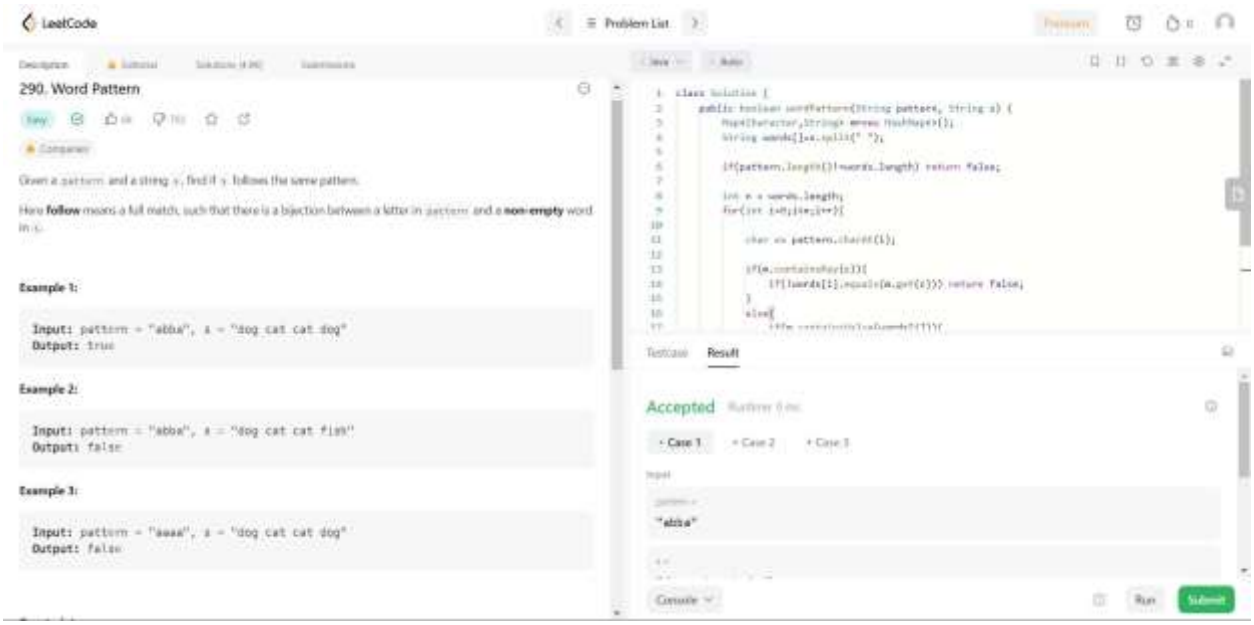
```
class Solution { public boolean wordPattern(String
    pattern, String s) {
        Map<Character,String> m=new HashMap<>();
        String words[]=s.split(" ");

        if(pattern.length()!=words.length) return false;

        int n = words.length;
        for(int i=0;i<n;i++){ char
        c= pattern.charAt(i);
```

```
            if(m.containsKey(c)){
                if(!words[i].equals(m.get(c))) return false;
            }
            else{
          if(m.containsValue(words[i])){
                    return false;
                }
                m.put(c, words[i]);
            }
        } return
        true;
    }
}
```

OUTPUT:



AIM: https://leetcode.com/problems/longest-duplicate-substring/

LONGEST DUPLICATE SUBSTRING

Given a string s, consider all duplicated substrings: (contiguous) substrings of s that occur 2 or more times. The occurrences may overlap.

Return any duplicated substring that has the longest possible length. If s does not have a duplicated substring, the answer is "".

Example 1:

```
Input: s = "banana"
Output: "ana"
```

Example 2:

```
Input: s = "abcd"
Output: ""
```

CODE:

```
class Solution {
  public String longestDupSubstring(String S) {
    int n = S.length();
    int[] nums = new int[n]; for
    (int i = 0; i < n; i++) {
      nums[i] = (int)S.charAt(i) - (int)'a';
    }
   int a = 26;
   long modulus = (long)Math.pow(2, 32);

    int left = 1, right = n; int L; while (left
    <= right) { L = left + (right - left) / 2; if
    (search(L, a, modulus, n, nums) == -1) {
        right = L - 1;
      } else { left =
        L + 1;
      }
    }

    int start = search(left - 1, a, modulus, n, nums);
  return S.substring(start, start + left - 1); }
  public int search(int L, int a, long modulus, int n, int[] nums) {
    long h = 0; for (int i = 0; i
    < L; i++) {
```

```
      h = (h * a + nums[i]) % modulus;
    }

    HashSet<Long> seen = new HashSet();
    seen.add(h); long aL = 1; for
    (int i = 1; i <= L; i++) {
      aL = (aL * a) % modulus;
    }

    for (int start = 1; start < n - L + 1; start++) {
      h = (h * a - nums[start - 1] * aL % modulus + modulus) % modulus;
      h = (h + nums[start + L - 1]) % modulus;

      if (seen.contains(h)) {
        return start;
      } else {
        seen.add(h);
      }
    }

    return -1;
  }
}
```

OUTPUT: