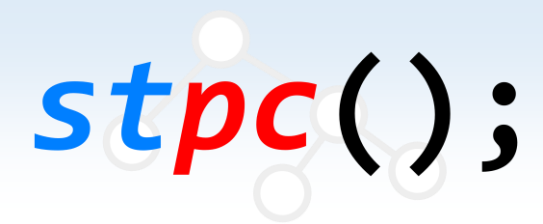


B – Yet Another String Algorithm

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Background

Problem Idea by `rina__owo`

Preparation by `rina__owo, pepper1208`

stpc();

Problem Restatement

Given a string S and a string T , find T in S using the KMP algorithm.

Output the prefix function calculated in the KMP algorithm and the position T first appears in S .

Subtasks

- Attempts: 5
- Max: 100
- First solved by **Chan Tsz Hang** at **29m 15s**

Subtasks Constraints

- Points are given per checkpoint in this problem. You can get the point of the checkpoint when you pass them.
- There are 10 checkpoints in total, each carry 10 points.

What is KMP algorithm?

- <https://www.youtube.com/watch?v=af1oqpnH1vA>

How to calculate the prefix function?

$$P[i] = \max_{k \in S} (P[k-1] + 1 \text{ if } T[i] = T[P[k-1]], 0) \text{ where } S = \{i, P[i-1], P[P[i-1]-1], \dots\}$$

Translating the pseudocode into C++

After computing P , the KMP algorithm can be implemented as follows:

```
subprogram KMP(S, T, P)
  N ← size of S
  M ← size of T
  i ← 0
  j ← 0
  while i < N and j < M do
    if S[i] = T[j] then
      i ← i + 1
      j ← j + 1
    else if j = 0 then
      i ← i + 1
    else then
      j ← P[j-1]
  if j = M then
    return i - j
  return -1          // Not found
```


Translating the pseudocode into C++

- Expected score: **100 AC!**

Takeaways

- Be familiar with different math symbols.
- Learn how to understand pseudocode. Algorithms will be often written in pseudocode in problems.
- Make great use of the samples given to let you understand more about the problem.
- Try actually substitute different numbers into the formula to figure out its pattern. This may help you understand it.