

- The length of *Text* will be between 1 and  $10^4$ .
- The number of patterns in the string-set *Patterns* will be between 1 and  $10^1$ .
- The length of any one pattern in *Patterns* will be between 1 and  $10^4$ .

## Test Cases

### Case 1

**Description:** The sample dataset is not actually run on your code.

#### Input:

AATCGGGTTCAATCGGGT  
ATCG GGGT

#### Output:

ATCG: 1 11  
GGGT: 4 15

#### Figure:

Burrows-Wheeler Matrix	Suffix Array
\$AATCGGGTTCAATCGGGT	19
AATCGGGT\$AATCGGGTC	10
AATCGGGTTCAATCGGGT\$	0
ATCGGGGT\$AATCGGGTTCA	11
ATCGGGTTCAATCGGGT\$A	1
CAATCGGGT\$AATCGGGTT	9
CGGGT\$AATCGGGTTCAAT	13
CGGGTTCAATCGGGT\$AAT	3
GGGT\$AATCGGGTTCAATC	14
GGGT\$AATCGGGTTCAATCG	15
GGGTCAATCGGGT\$AATC	4
GGT\$AATCGGGTTCAATCGG	16
GGTTCAATCGGGT\$AATCG	5
GT\$AATCGGGTTCAATCGGG	17
GTTCAATCGGGT\$AATCGG	6
T\$AATCGGGTTCAATCGGGG	18
TCAATCGGGT\$AATCGGGT	8
TCGGGT\$AATCGGGTTCAA	12
TCGGGTCAATCGGGT\$AA	2
TTCAATCGGGT\$AATCGGG	7

The complete Burrows-Wheeler matrix shown above can be inferred using only the Burrows-Wheeler transform of this string and the Last-To-First property of the Burrows-Wheeler transform. We then search for our query strings, ATCG and GGGT, as prefixes in the rows of our matrix. Finally, we can use the suffix array of the database string to locate the positions of query matches.

## Case 2

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**Description:** There are no matches in *Text* to any pattern in *Patterns*.

**Input:**

```
ATATATATAT
GT AGCT TAA AAT AATAT
```

**Output:**

```
GT:
AGCT:
TAA:
AAT:
AATAT:
```

## Case 3

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**Description:** *Text* contains overlapping occurrences of *Patterns*.

**Input:**

```
bananas
ana as
```

**Output:**

```
ana:  1 3
as:   5
```

## Case 4

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**Description:** Large regions of *Text* being a single character or short tandem repeat (STR).

**Input:**

```
AAACAA
AA
```

**Output:**

```
AA: 0 1 4
```

### Case 5

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**Description:** *Text* is palindromic or has substrings that are palindromic.

**Input:**

GAGCAT

GA AG

**Output:**

GA: 0

AG: 1

### Case 6

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**Description:** A larger dataset of the same size as that provided by the randomized autograder. Check input/output folders for this dataset.