

CNNAS 10

10-8-08

Problem: PATTERN MATCHING

EX.  $n=18, m=2$

text: 'to-be-en-not-to-be' <sup>(4)</sup> <sup>(17)</sup>

PATTERN: 'be'

ANSWERS: 4, 17

EX.  $n=10, m=3$

text: 'xxxaaaaaxx' <sup>(4)</sup> <sup>(5)</sup> <sup>(6)</sup>

PATTERN: 'aaa'

ANSWERS: 4, 5, 6

EX  $n = 7, m = 3$

TESTING POSITIONS

$T_1 T_2 T_3 T_4 T_5 T_6 T_7$   
 $P_1 P_2 P_3 \rightarrow \text{SLIDE OVER}$

1

$T_1 T_2 T_3 T_4 T_5 T_6 T_7$   
 $P_1 P_2 P_3 \rightarrow \text{SLIDE OVER}$

2

⋮

$T_1 T_2 T_3 T_4 T_5 T_6 T_7$   
 $P_1 P_2 P_3$

5

INPUT: INTEGERS  $n, m$  s.t.  $1 \leq m \leq n$

TEXT:  $T_1 \dots T_n$ , PATTERN  $P_1 \dots P_m$

OUTPUT: ALL INDEXED s.t.  $P_1 \dots P_m$  MATCHES  $T_i T_{i+1} \dots T_{i+m-1}$

PATTERN MATCH

- 1.)  $i \leftarrow 1$
- 2.) while  $i \leq n - m + 1$
- 3.)  $j \leftarrow 1$
- 4.) match  $\leftarrow$  true
- 5.) while ( $j \leq m$  and match)
- 6.)  $\left[ \begin{array}{l} \text{if } P_j \neq T_{i+j-1} \\ \text{match} \leftarrow \text{false} \end{array} \right.$
- 7.)
- 8.) else
- 9.)  $j \leftarrow j + 1$
- 10.) if match
- 11.) Print 'match found at position'  $i$
- 12.)  $i \leftarrow i + 1$
- 13.) stop

EXERCISE - MAKE THIS ON TWO PREVIOUS EXAMPLES. + ONE MORE THAT YOU MAKE UP.

EX  $n=4, m=2$ , text: 'abcd', pattern: 'bc'



1	+	2	+	3	+	4
		+	+	+	+	+
		+	+	+	+	+
		+	+	+	+	+
		+	+	+	+	+

OUTPUT:

match found at position 2

# Attributes of Algorithms

- CONCRETENESS
- CLARITY
- ELEGANCE
- EFFICIENCY



EX.  
 1.) get  $n$   
 2.) Print  $\frac{n(n+1)}{2}$   
 3.) stop

EX.  
 1.) get  $n$   
 2.)  $sum \leftarrow 0$   
 3.)  $i \leftarrow 1$   
 4.) while  $i \leq n$   
 5.)  $sum \leftarrow sum + i$   
 6.)  $i \leftarrow i + 1$   
 7.) Print  $sum$   
 8.) stop