Substring Search

Back to Week 4

3/3 points earned (100%)

Quiz passed!

1 / 1 points

1.
(seed = 481253)

Consider the Knuth-Morris-Pratt DFA for the following string of length 8:

A B A A B A B C

What is sequence of values in the row of the DFA corresponding to the character 'A'? For reference, here is the partially-completed DFA:

```
1         0  1  2  3  4  5  6  7
2         ---------------------
3      A  ?  ?  ?  ?  ?  ?  ?  ?
4      B  0  2  0  2  5  0  7  0
5      C  0  0  0  0  0  0  0  8
```

1 1 3 4 1 6 4 3

Correct Response

The correct answer is: 1 1 3 4 1 6 4 3

Here is the DFA:

```
1     0  1  2  3  4  5  6  7
2     ---------------------
3  A  1  1  3  4  1  6  4  3
4  B  0  2  0  2  5  0  7  0
5  C  0  0  0  0  0  0  0  8
```

1 / 1
points

2.

(seed = 608030)
Suppose that you run the Boyer-Moore algorithm (using only the mismatched character heuristic) to search for the pattern

I D I T A N D

in the text

A B O U R A N D H E F O U N D I T A N D D I D I T A N D M A

What is the sequence of characters in the text that is compared with the last character in the pattern?

N D O N D D I A D

Correct Response

The correct answer is: N D O N D D I A D

Here is a trace:

```
 i  j i+j   0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
-------------------------------------------------------------------------------------------------
          A  B  O  U  R  A  N  D  H  E  F  O  U  N  D  I  T  A  N  D  D  I  D  I  T  A  N  D  M  A
 0  6  6  I  D  I  T  A  N  D
 1  3  4     I  D  I  T  A  N  D
 5  6 11                 I  D  I  T  A  N  D
12  6 18                                    I  D  I  T  A  N  D
13  0 13                                       I  D  I  T  A  N  D
14  5 19                                          I  D  I  T  A  N  D
15  6 21                                             I  D  I  T  A  N  D
19  6 25                                                      I  D  I  T  A  N  D
21  0 21                                                            I  D  I  T  A  N  D
```

1 / 1

points

3.

```
(seed = 68492)
What is the Rabin-Karp hash function of text[3..11] over the decimal
alphabet with R = 10 and using the modulus Q = 83?

      j      0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19
    ------------------------------------------------------------------
    text[j]   1  9  4  6  2  ?  ?  ?  ?  6  7  2  8  4  4  5  2  6  4  9

The digits labeled with a ? are suppressed (and are not needed to solve the problem).
Assume that the hash function of text[2..10] is 13 and that you have precomputed
100000000 (mod 83) = 23.
```

42

Correct Response

```
The correct answer is: 42


hash(462329767) = 462329767 (mod 83)
                = 13

hash(100000000) = 100000000 (mod 83)
                = 23

623297672 = (462329767 - 4*100000000) * 10 + 2
hash(623297672) = (462329767 - 4*100000000) * 10 + 2 (mod 83)
hash(623297672) = (13 - 4*23) * 10 + 2  (mod 83)
                = -41 (mod 83)
                = -41 + 83 (mod 83)
                = 42

Recall that the Java operator % is remainder, and not modulus. When taking
a dividend mod Q, the result is a value between 0 and Q-1; with remainder,
the result can be a negative value if the dividend is negative.
```