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1. given that,

$$\Sigma = \{a, b, c\}$$

$$D = \{0, 1, 2, 3, 4, 5\}$$

$$B = (0, 1)$$

(a) Two string from each Alphabet —

Σ : aabbccabe, ~~aab~~ aabbccabacbe

D : 201543, 412035

B : 001101, 01010011

(b)

String	Suffix	Prefix	Subsequence	Sub string
aabbccabe	cabe	aabb	cab	bbee
aabbccabacbe	baacbe	aabb	baba	bcca
201543	543	201	2143	154
412035	035	412	4105	123
001101	01	00	011	110

01010011

011

010

0101

0100

(c) given that,

$$D = \{0, 1, 2, 3, 4, 5\}$$

$$\mathcal{L} = \{a, b, c\}$$

$$D^2 \mathcal{L} = \{0, 1, 2, 3, 4, 5\} \{0, 1, 2, 3, 4, 5\} \cdot \{a, b, c\}$$

$$= \{00, 01, 02, 03, 04, 05, 10, 11, 12, 13, 14, 15, 20,$$

$$21, 22, 23, 24, 25, 30, 31, 32, 33, 34, 35, 40, 41,$$

$$42, 43, 44, 45, 50, 51, 52, 53, 54, 55\} \{a, b, c\}$$

$$= \{00a, 01a, 02a, 03a, 04a, 05a, 10a, 11a,$$

$$12a, 13a, 14a, 15a, 20a, 21a, 22a, 23a, 24a,$$

$$25a, 30a, 31a, 32a, 33a, 34a, 35a, 40a, 41a,$$

$$42a, 43a, 44a, 45a, 50a, 51a, 52a, 53a,$$

$$54a, 55a, 00b, 01b, 02b, 03b, 04b, 05b,$$

$$10b, 11b, 12b, 13b, 14b, 15b, 20b, 21b, 22b,$$

$$23b, 24b, 25b, 30b, 31b, 32b, 33b, 34b, 35b,$$

$40b, 41b, 42b, 43b, 44b, 45b, 50b, 51b, 54b, 53b,$
 $54b, 55b, 00c, 01c, 02c, 03c, 04c, 05c, 10c, 11c,$
 $12c, 13c, 14c, 15c, 20c, 21c, 22c, 23c, 24c,$
 $25c, 30c, 31c, 32c, 33c, 34c, 35c, 40c,$
 $41c, 42c, 43c, 44c, 45c, 50c, 51c, 52c,$
 $53c, 54c, 55c \}$

5. Let $A = \{a, e, i, o, u, p, q, r, s, t\}$

and $(a, e, i, o, u, p, q, r, s, t) = (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)$

a) Priest

Let $u = \text{"Priest"}$, $k = 572189$

Hence, $k_1 = 5$, $k_2 = 7$, $k_3 = 2$, $k_4 = 1$

$k_5 = 8$, $k_6 = 9$

$2 \cdot 5 + 2 \cdot 5 + 7 + 1 + 2 \cdot 5 + 7 + 2 + 2 + 2 \cdot 5 + 7 + 2 + 1$

$$\begin{aligned}
 & + 2^{5+7+2+1+8} + 2^{5+7+2+1+8+9+5} - 1 \\
 & = 2^5 + 2^{11} + 2^{16} + 2^{18} + 2^{27} + 2^{37} - 1 \\
 & = 1.375735071 \times 10^{11}
 \end{aligned}$$

(b) quiet

Let $\epsilon = \text{"quiet"}$, $\kappa = \text{"64219"}$

Hence $\kappa_1 = 6, \kappa_2 = 4, \kappa_3 = 2, \kappa_4 = 1, \kappa_5 = 9$

$$\begin{aligned}
 y &= 2^6 + 2^{6+4+1} + 2^{6+4+2+2} + 2^{6+4+2+1+3} \\
 &+ 2^{6+4+2+1+9+4} - 1 \\
 &= 2^6 + 2^{11} + 2^{14} + 2^{16} + 2^{26} - 1 \\
 &= 6.71928 \times 10^7
 \end{aligned}$$

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⑥ 9. $[A_4]$ IF $x_2 \neq$ GOTO B_2 $I_1 \rightarrow \langle 16, 9, 8 \rangle$

$= \langle 16, 3583 \rangle = 469,$

$z_3 \leftarrow z_3 + 1$ $I_2 \rightarrow \langle 0, 1, 6 \rangle = \langle 0, 25 \rangle$

$= 50$

IF $z_3 \neq$ GOTO E $I_3 \rightarrow \langle 0, 7, 6 \rangle = \langle 0, 1663 \rangle$

$[B_2]$ $x_2 \leftarrow x_2 - 1$ $I_4 \rightarrow \langle 7, 2, 3 \rangle = \langle 7, 27 \rangle$

$= 7039$

$y \leftarrow y + 1$ $I_5 \rightarrow \langle 0, 1, 0 \rangle = \langle 0, 1 \rangle = \langle 0, 1 \rangle$

$= 2$

$z_3 \leftarrow z_3 + 1$ $I_6 \rightarrow \langle 0, 1, 6 \rangle = \langle 0, 25 \rangle$

$= 50$

IF $z_3 \neq 0$ GOTO A_4 $I_7 \rightarrow \langle 0, 18, 67 \rangle = \langle 0, 3442 \rangle$

$= 6815742$

Program

2 469. 696. 511. 3⁵⁰. 5³³²⁶. 7⁷⁰
11². 13⁵⁰. 17 6815742 - 1.

6

$$6. \quad A = \{ \underset{\downarrow}{a}, \underset{\downarrow}{b}, \underset{\downarrow}{c}, \underset{\downarrow}{d}, \underset{\downarrow}{e}, \underset{\downarrow}{f}, \underset{\downarrow}{7}, \underset{\downarrow}{8}, \underset{\downarrow}{9} \}$$

$$\quad \quad \quad \underset{\downarrow}{0} \quad \underset{\downarrow}{1} \quad \underset{\downarrow}{2} \quad \underset{\downarrow}{3} \quad \underset{\downarrow}{4} \quad \underset{\downarrow}{5} \quad \underset{\downarrow}{6} \quad \underset{\downarrow}{7} \quad \underset{\downarrow}{8}$$

$$u) 417$$

$$y = 417$$

$$y+1 = 417+1 = 418 = 209 \cdot 2$$

$$= (104 \cdot 2 + 1) \cdot 2$$

$$= (52 \cdot 2 \cdot 2 + 1) \cdot 2$$

$$= (26 \cdot 2 \cdot 2 \cdot 2 + 1) \cdot 2$$

$$= (13 \cdot 2 \cdot 2 \cdot 2 \cdot 2 + 1) \cdot 2$$

$$= ((6 \cdot 2 + 1) \cdot 2^4 + 1) \cdot 2$$

$$= ((3 \cdot 2 \cdot 2 + 1) \cdot 2^4 + 1) \cdot 2$$

$$= ((2+1) \cdot 2^2 + 1) \cdot 2^4 + 1 \cdot 2$$

$$= (2^3 + 2^2 + 1 \cdot 2^4 + 1) \cdot 2$$

$$= (2^7 + 2^6 + 2^4 + 1) \cdot 2$$

$$= 2^8 + 2^7 + 2^6 + 2^1$$

7

$$y_1 = 1$$

$$y_2 = 6$$

$$y_3 = 7$$

$$y_4 = 8$$

$$u_1 = y_1 = 1 \rightarrow b$$

$$u_2 = y_2 - y_1 - 1 = 6 - 1 - 1 = 4 = e$$

$$u_3 = y_3 - y_2 - 1 = 7 - 6 - 1 = 0 = a$$

$$u_4 = y_4 - y_3 - 1 = 8 - 7 - 1 = 0 \rightarrow a$$

\therefore string beaa.

$$(b) \ y = 350$$

$$y+1 = 351 = (172 \cdot 2 + 1)$$

$$= ((87 \cdot 2 + 1) \cdot 2 + 1)$$

$$= (((43 \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1)$$

$$= (((21 \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1$$

$$= (((((10 \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1)$$

$$= (((((5 \cdot 2 \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1)$$

$$= (((((2^2 + 1) \cdot 2^2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1)$$

$$= (((((2^4 + 2^2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1)$$

$$= (((2^5 + 2^3 + 2 + 1) \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 1$$

$$= ((2^6 + 2^4 + 2^2 + 2 + 1) \cdot 2 + 1) \cdot 2 + 1$$

$$= (2^7 + 2^5 + 2^3 + 2^2 + 2 + 1) \cdot 2 + 1$$

$$= 2^8 + 2^6 + 2^4 + 2^3 + 2^2 + 2 + 1$$

So, $y_1 = 0, y_2 = 1, y_3 = 2, y_4 = 3$

$y_5 = 4, y_6 = 6, y_7 = 8$

$u_1, y_1 = 0 \longrightarrow a$

$u_2 = y_2 - y_1 - 1 = 0 \quad c$

g

$$u_3 = y_3 - y_2 - 1 = 0 \rightarrow a$$

$$u_4 = y_4 - y_3 - 1 = 0 \rightarrow a$$

$$u_5 = y_5 - y_4 - 1 = 0 \rightarrow a$$

$$u_6 = y_6 - y_5 - 1 = 1 \rightarrow g$$

$$u_7 = y_7 - y_6 - 1 = 1 \rightarrow b$$

string

aaaaabbb