Name: _____ ID:_____

CIS 455 Class Activity #5: Longest Common Subsequence - Dynamic Programming

Apply the LCS algorithm to the alignment problem below:

LCS(**v**, **w**)

1 **for** $i \leftarrow 0$ **to** n

2 $\quad s_{i,0} \leftarrow 0$

3 **for** $j \leftarrow 1$ **to** m

4 $\quad s_{0,j} \leftarrow 0$

5 **for** $i \leftarrow 1$ **to** n

6 $\quad$ **for** $j \leftarrow 1$ **to** m

7 $$s_{i,j} \leftarrow \max \begin{cases} s_{i-1,j} \\ s_{i,j-1} \\ s_{i-1,j-1} + 1, & \text{if } v_i = w_j \end{cases}$$

8 $$b_{i,j} \leftarrow \begin{cases} \text{“}\uparrow\text{”} & \text{if } s_{i,j} = s_{i-1,j} \\ \text{“}\leftarrow\text{”} & \text{if } s_{i,j} = s_{i,j-1} \\ \text{“}\nwarrow\text{”}, & \text{if } s_{i,j} = s_{i-1,j-1} + 1 \end{cases}$$

9 **return** $(s_{n,m}, \mathbf{b})$

		C	T	T	G	C	T	A
	0	0	0	0	0	0	0	0
A	0	0	0	0	0	0	0	1
C	0	1	1	1	1	1	1	1
T	0	1	2	2	2	2	2	2
T	0	1	2	3	3	3	3	3
C	0	1	2	3	3	4	4	4
T	0	1	2	3	3	4	5	5
G	0	1	2	3	4	4	5	5

Final alignment result:

A	C	T	T	—	C	T	—	G			
—	C	T	T	G	C	T	A	—			