

Gotoh & WSB, SoP Unit Tests

Hint: Many test values are taken from project Algorithms for Bioninformatics of Alexander Mattheis or the lectures.

Test 1

Input

Sequence A: TGGA

Sequence B: GG

Gap Opening: -3 $g(k) = -3 - k \cdot 1$

Enlargement: -1

Match: 0

Mismatch: -1

Output

		T	G	G	A
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$
G	-	-8	-9	-10	-11
G	-	-5	-8	-9	-11

		T	G	G	A
	0	-4	-5	-6	-7
G	-4	-1	-4	-5	-7
G	-5	-5	-1	-4	-6

		T	G	G	A
	-	-	-	-	-
G	$-\infty$	-8	-5	-6	-7
G	$-\infty$	-9	-9	-5	-6

Seq1 TGGA

*|

Seq2 __GG

		T	G	G	A
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$
G	-	-8	-9	-10	-11
G	-	-5	-8	-9	-11

		T	G	G	A
	0	-4	-5	-6	-7
G	-4	-1	-4	-5	-7
G	-5	-5	-1	-4	-6

		T	G	G	A
	-	-	-	-	-
G	$-\infty$	-8	-5	-6	-7
G	$-\infty$	-9	-9	-5	-6

Seq1 T G G A
 | *
 Seq2 G G _ _

Test 2

Input

Sequence A: C C G A
 Sequence B: C G

Gap Opening: -3
 Enlargement: -1
 Match: 1
 Mismatch: -1

$g(k) = -3 - k \cdot 1$

Output

		C	C	G	A
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$
C	-	-8	-9	-10	-11
G	-	-3	-7	-8	-9

		C	C	G	A
	0	-4	-5	-6	-7
C	-4	1	-3	-4	-5
G	-5	-3	0	-2	-5

		C	C	G	A
	-	-	-	-	-
C	$-\infty$	-8	-3	-4	-5
G	$-\infty$	-9	-7	-4	-5

Seq1 C C G A
 * |
 Seq2 C _ G

		C	C	G	A
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$
C	-	-8	-9	-10	-11
G	-	-3	-7	-8	-9

		C	C	G	A
	0	-4	-5	-6	-7
C	-4	1	-3	-4	-5
G	-5	-3	0	-2	-5

		C	C	G	A
	-	-	-	-	-
C	$-\infty$	-8	-3	-4	-5
G	$-\infty$	-9	-7	-4	-5

Seq1 CCGA
 *|
 Seq2 CG__

Test 3

Input

Sequence A: TACGCAGA
 Sequence B: TCCGA

Gap Opening: -4 $g(k) = -4 - k \cdot 1$
 Enlargement: -1
 Match: 1
 Mismatch: 0

Output

		T	A	C	G	C	A	G	A
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$
T	-	-10	-11	-12	-13	-14	-15	-16	-17
C	-	-4	-9	-10	-11	-12	-13	-14	-15
C	-	-5	-4	-8	-10	-10	-12	-13	-14
G	-	-6	-5	-3	-8	-9	-10	-11	-12
A	-	-7	-6	-4	-2	-7	-8	-9	-10

		T	A	C	G	C	A	G	A
	0	-5	-6	-7	-8	-9	-10	-11	-12
T	-5	1	-4	-5	-6	-7	-8	-9	-10
C	-6	-4	1	-3	-5	-5	-7	-8	-9
C	-7	-5	-4	2	-3	-4	-5	-6	-7
G	-8	-6	-5	-3	3	-2	-3	-4	-5
A	-9	-7	-5	-4	-2	3	-1	-3	-3

		T	A	C	G	C	A	G	A
	-	-	-	-	-	-	-	-	-
T	$-\infty$	-10	-4	-5	-6	-7	-8	-9	-10
C	$-\infty$	-11	-9	-4	-5	-6	-7	-8	-9
C	$-\infty$	-12	-10	-9	-3	-4	-5	-6	-7
G	$-\infty$	-13	-11	-10	-8	-2	-3	-4	-5
A	$-\infty$	-14	-12	-10	-9	-7	-2	-3	-4

Seq1 TACGCAGA
 | **
 Seq2 TCC__GA

		T	A	C	G	C	A	G	A
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$	$-\infty$
T	-	-10	-11	-12	-13	-14	-15	-16	-17
C	-	-4	-9	-10	-11	-12	-13	-14	-15
C	-	-5	-4	-8	-10	-10	-12	-13	-14
G	-	-6	-5	-3	-8	-9	-10	-11	-12
A	-	-7	-6	-4	-2	-7	-8	-9	-10

		T	A	C	G	C	A	G	A
	0	-5	-6	-7	-8	-9	-10	-11	-12
T	-5	1	-4	-5	-6	-7	-8	-9	-10
C	-6	-4	1	-3	-5	-5	-7	-8	-9
C	-7	-5	-4	2	-3	-4	-5	-6	-7
G	-8	-6	-5	-3	3	-2	-3	-4	-5
A	-9	-7	-5	-4	-2	3	-1	-3	-3

		T	A	C	G	C	A	G	A
	-	-	-	-	-	-	-	-	-
T	-∞	-10	-4	-5	-6	-7	-8	-9	-10
C	-∞	-11	-9	-4	-5	-6	-7	-8	-9
C	-∞	-12	-10	-9	-3	-4	-5	-6	-7
G	-∞	-13	-11	-10	-8	-2	-3	-4	-5
A	-∞	-14	-12	-10	-9	-7	-2	-3	-4

Seq1 TACGCAGA

* *|**

Seq2 T__CCGA

		T	A	C	G	C	A	G	A
	-	-∞	-∞	-∞	-∞	-∞	-∞	-∞	-∞
T	-	-10	-11	-12	-13	-14	-15	-16	-17
C	-	-4	-9	-10	-11	-12	-13	-14	-15
C	-	-5	-4	-8	-10	-10	-12	-13	-14
G	-	-6	-5	-3	-8	-9	-10	-11	-12
A	-	-7	-6	-4	-2	-7	-8	-9	-10

		T	A	C	G	C	A	G	A
	0	-5	-6	-7	-8	-9	-10	-11	-12
T	-5	1	-4	-5	-6	-7	-8	-9	-10
C	-6	-4	1	-3	-5	-5	-7	-8	-9
C	-7	-5	-4	2	-3	-4	-5	-6	-7
G	-8	-6	-5	-3	3	-2	-3	-4	-5
A	-9	-7	-5	-4	-2	3	-1	-3	-3

		T	A	C	G	C	A	G	A
	-	-	-	-	-	-	-	-	-
T	-∞	-10	-4	-5	-6	-7	-8	-9	-10
C	-∞	-11	-9	-4	-5	-6	-7	-8	-9
C	-∞	-12	-10	-9	-3	-4	-5	-6	-7
G	-∞	-13	-11	-10	-8	-2	-3	-4	-5
A	-∞	-14	-12	-10	-9	-7	-2	-3	-4

Seq1 TACGCAGA

*|** *

Seq2 TCCG__A

Test 4

Input

Sequence A: ACCT
Sequence B: CC

Gap Opening: -4
Enlargement: -1
Match: 0
Mismatch: -1

$$g(k) = -4 - k \cdot 1$$

Output

		A	C	C	T
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$
C	-	-10	-11	-12	-13
C	-	-6	-10	-11	-13

		A	C	C	T
	0	-5	-6	-7	-8
C	-5	-1	-5	-6	-8
C	-6	-6	-1	-5	-7

		A	C	C	T
	-	-	-	-	-
C	$-\infty$	-10	-6	-7	-8
C	$-\infty$	-11	-11	-6	-7

Seq1 ACCT
*|
Seq2 __CC

		A	C	C	T
	-	$-\infty$	$-\infty$	$-\infty$	$-\infty$
C	-	-10	-11	-12	-13
C	-	-6	-10	-11	-13

		A	C	C	T
	0	-5	-6	-7	-8
C	-5	-1	-5	-6	-8
C	-6	-6	-1	-5	-7

		A	C	C	T
	-	-	-	-	-
C	$-\infty$	-10	-6	-7	-8
C	$-\infty$	-11	-11	-6	-7

Seq1 ACCT
|*
Seq2 CC__

Test 5-8: Needleman-Wunsch-Tests-Simulation by setting gap opening to 0.