P1.

1. Bottom-up

2

15 12

10 6 14 8

2

15 14

10 6 12 8

15

2 14

10 6 12 8

15

10 14

2 6 12 8

1. Top-down

2

15

15

2 12

10

15

10 12

2 6 14

15

10 14

2 6 12 8

c. It is not always true that the two algorithms will yield the same heap for the same input

P2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Char | T | C | A | \*\* |
| Shift | 1 | 3 | 6 | 11 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| T | T | A | T | A | G | A | T | C | T | C | G | T | A | T | T | C | T | T | T | T | A | T | A | G | A | T | C | T | C | C | T | A | T | T | C | T | T | T |
| T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | T | C | C | T | A | T | T | C | T | T | T |