

## CT Extra Practice Questions (on Topics from Weeks 1 – 5)

### Answer Key

1 (a) array sorted in opposite order

2 (d) there will always be  $n \log n$  shifts

3 (d)  $n$  should not appear in the term.  $O(m) \rightarrow$  linear relationship between  $m$  and the number of operations.

4 (a)

5  $O(10^n)$

6  $10P_4$  or  $10 \times 9 \times 8 \times 7$  or 5040

7  $4!$  or  $4 \times 3 \times 2 \times 1$  or 24 or  $4P_4$

8 (a)  $1 \times 9 \times 9 \times 9 \times 4$

case 1: 0 is at 1<sup>st</sup> position  $\rightarrow 1 \times 9 \times 9 \times 9$

case2: 0 is at 2<sup>nd</sup> position  $\rightarrow 9 \times 1 \times 9 \times 9$

case3: 0 is at 3<sup>rd</sup> position  $\rightarrow 9 \times 9 \times 1 \times 9$

case4: 0 is at 4<sup>th</sup> position  $\rightarrow 9 \times 9 \times 9 \times 1$

9 (a) Algo X:  $O(5^n)$

(b) Algo Y:  $O(n^2)$

(c) Algo Z:  $O(\log n)$

(d) best to worst: Z, Y, X

10 (a) 5

(b) 4

(c)  $O(n)$

(d) linear (or sequential) search for key in arr.

11 (a)  $O(1)$

(b)

```
def get_perimeter(points):
    prev_point = last point in points
    perimeter = 0
    for p in points:
        perimeter += get_distance(prev_point, p)
    return perimeter
```

(c)  $O(n)$

~~12. no. of ways of groups of 4 children =  $9C_4 = 126$~~

~~Each of the children should have equal no. of times =  $126/9 = 14$  times~~

12. For each child, he will get to go with different sets of 3 other children.

Therefore, # of times he get to go zoo =  $8C_3 = 56$ .

13. (a)  $O(n)$

14. Blank 1: `array[mid] + array[mid+1]`

Blank 2: ~~`target < array[mid] = array[mid+1]`~~  
`target < array[mid] + array[mid+1]`

Blank 3: 100

15. (a)  $O(2^{2n})$

16. As  $n \rightarrow \infty$ ,  $k > 100$  and only the print statement is executed (constant time)  
 $\therefore$  Time complexity of function is  $O(1)$

17. (a)  $O(n \log n)$

18.  $\gcd(36, 81) \rightarrow \gcd(81, 36) \rightarrow \gcd(36, 9) \rightarrow \gcd(9, 0)$

19. 

```
def insert(A, O):
    A.append(O)
    j = len(A) - 1
    while j > 0 and A[j] < A[j-1] priority(A[j]) < priority(A[j-1]):
        A[j], A[j-1] = A[j-1], A[j]
        j -= 1
```

20. (b) [2,5,9,14,1,3,19,45]

21. (c)  $10C4 - 4C4 = 209$     or     $6C1 \times 4C3 + 6C2 \times 4C2 + 6C3 \times 4C1 + 6C4 = 209$