

1. Let Q denote a queue containing sixteen numbers and S be an empty stack. $\text{Head}(Q)$ returns the element at the head of the queue Q without removing it from Q . Similarly $\text{Top}(S)$ returns the element at the top of S without removing it from S . Consider the algorithm given below.

```

while  $Q$  is not Empty do
    if  $S$  is Empty OR  $\text{Top}(S) \leq \text{Head}(Q)$  then
         $x := \text{Dequeue}(Q);$ 
         $\text{Push}(S, x);$ 
    else
         $x := \text{Pop}(S);$ 
         $\text{Enqueue}(Q, x);$ 
    end
end

```

The maximum possible number of iterations of the while loop in the algorithm is _____ [This Question was originally a Fill-in-the-Blanks question]

- A. 16
- B. 32
- C. 256
- D. 64

Answer: C

The worst case happens when the queue is sorted in decreasing order. In worst case, loop runs $n*n$ times.

2. The keys 198, 171, 123, 258, 375, 419, 68 are to be inserted into a hash table of size 9 using open

Addressing with hash function $h(k) = k \bmod 9$ and quadratic probing. What will be the locations of keys 68 and 375 in the hash table?

- A. 3 and 7
- B. 5 and 1
- C. 2 and 4
- D. 3 and 4

Answer: D

Explanation:

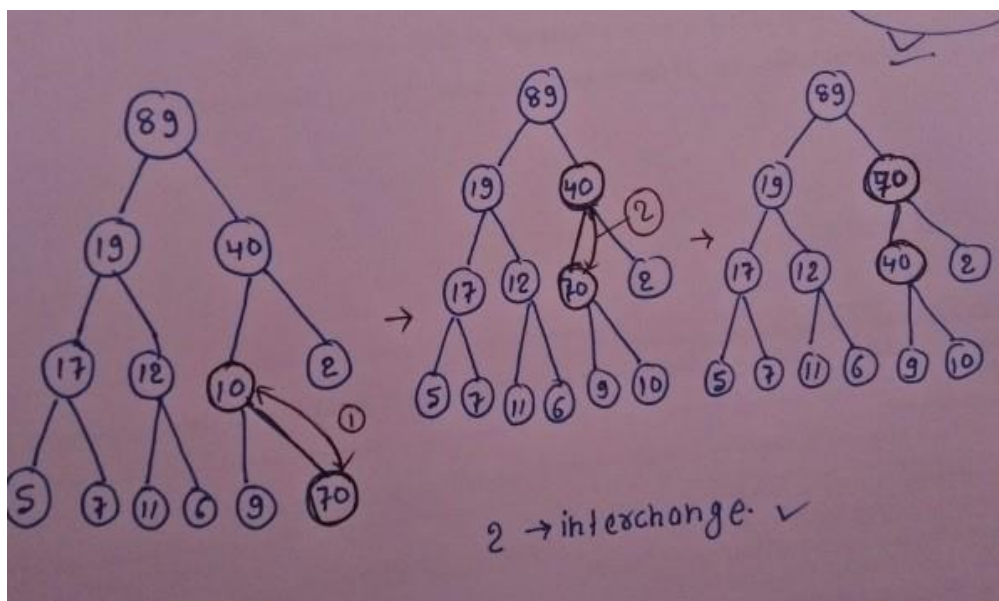
0	198	$198 = 22 \cdot 9 + 0$
1	171	0
2		1 probe.
3	68	$171 = 19 \cdot 9 + 0$
4	375	0 1
5	419	2 probes.
6	123	$123 = 13 \cdot 9 + 6$
7	258	6
8		1 probe.
		$258 = 28 \cdot 9 + 6$
		6 7
		2 probes.
		$375 = 41 \cdot 9 + 6$
		6 7 1 6 4
		5 probes.
		$419 = 46 \cdot 9 + 5$
		5
		1 probe.
		$68 = 7 \cdot 9 + 5$
		5 6 0 5 3
		5 probes.

3. The minimum number of interchanges needed to convert the array 89, 19, 40, 17, 12, 10, 2, 5, 7, 11, 6, 9, 70 into a heap with the maximum element at the root is

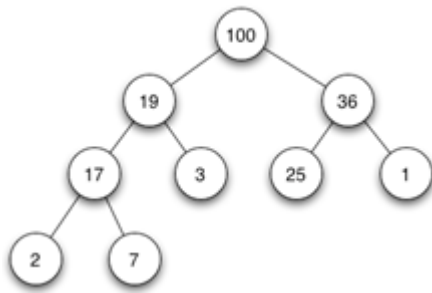
- A. 0
- B. 1
- C. 2
- D. 3

Answer: C

Explanation:



4.



If we implement heap as maximum heap , adding a new node of value 35,. What values will be at leaf nodes of the left subtree of the heap.

- A. 35 , 2 and 7
- B. 3 and 2 and 7
- C. 35 and 7
- D. 2 and 7

Answer: B

Explanation: As 35 is greater than 3, so there is a violation and the node will swap at that position. So leaf nodes with value s are 2 , 7 and 3.

5. A hash table size is 10 and you're inserted the following letters of string K R P C S N Y T J M into the that hash table by using $h(x) = ((ord(x) - ord(A) + 1)) \bmod 10$.you know linear probing will solve collision, then which letter insertion triggers the collision?

- A. Y
- B. C
- C. M
- D. P

Answer: C