Abdullah 02-131222-099

Question # 01 (A):

1): There are exactly four red books.

$\exists a\ \exists b\ \exists c\ \exists d\ book(a) \wedge red(a) \wedge book(b) \wedge red(b) \wedge book(c) \wedge red(c) \wedge book(d) \wedge red(d) \wedge \neg(a=b) \wedge \neg(a=c) \wedge \neg(a=d) \wedge \neg(b=c) \wedge \neg(b=d) \wedge \neg(c=d) \wedge \forall x\ (book(x) \wedge red(x)) \rightarrow ((a=x) \vee (b=x)) \vee (c=x) \vee (d=x))$

2) There are atleast four red books

$\exists a\ \exists b\ \exists c\ \exists d\ book(a) \wedge red(a) \wedge book(b) \wedge red(b) \wedge book(c) \wedge red(c) \wedge book(d) \wedge red(d) \wedge \neg(a=b) \wedge \neg(a=c) \wedge \neg(a=d) \wedge \neg(b=c) \wedge \neg(b=d) \wedge \neg(c=d)$

3): There are almost four red books.

$\exists a\ \exists b\ \exists c\ \exists d\ book(a) \wedge red(a) \wedge book(b) \wedge red(b) \wedge book(c) \wedge red(c) \wedge book(d) \wedge red(d) \wedge \forall x\ (book(x) \wedge red(x)) \rightarrow (a=x) \vee (b=x) \vee (c=x) \vee (d=x)$.

Question # 01 (B):

1) C is true or not

$(A \wedge B) \vee D \Rightarrow C$ ——— (i)

$B \wedge K$ ——— (ii)

$A \vee K$ ——— (iii)

$\sim N$ ——— (iv)

- By applying unil resolution rule on statement (iii) and (iv), we know that A is true
- By Applying and elimination we know that B is true
- from above, we Come to know that A and B are true

∴ C is true.

2): E is true or not

$(A \vee B) \wedge (C \vee D) \Rightarrow E$ → I

$A \wedge K$ → II

$\sim K$ → III

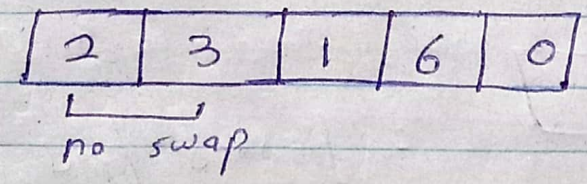
$C \wedge T$ → IV

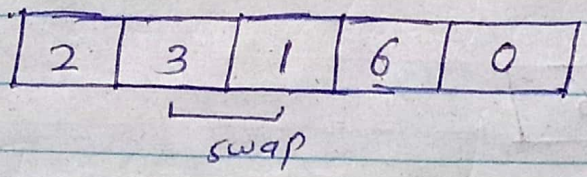
- By applying and Elimination on II we came to know that
  A is true
- By applying And elimination on IV, we know that C is true
- from above we come to know that
  E is true

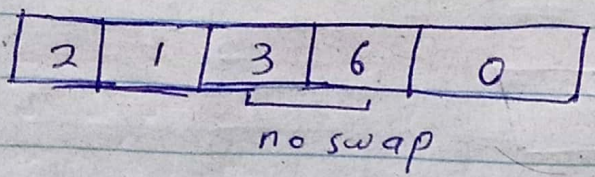
Question # 02 (A):

- Bubble sort

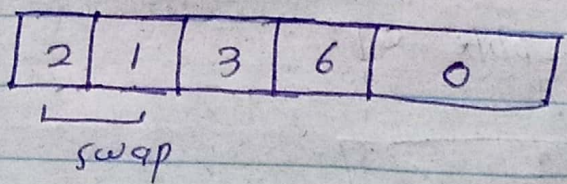
  2, 3, 1, 6, 0

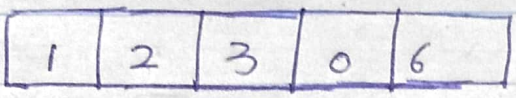


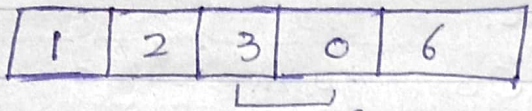


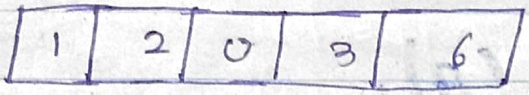


: finished first

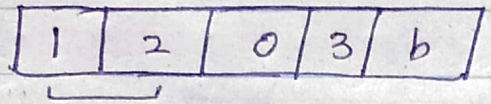


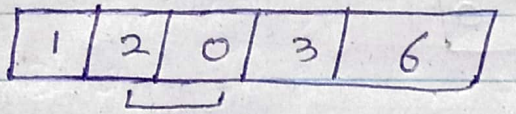




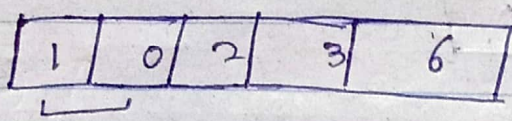


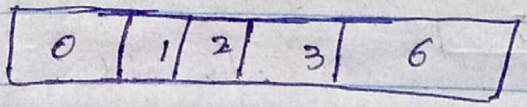
: finished second





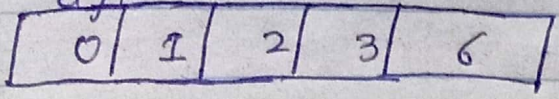
: finished third





: finshed fourth " bubble up".

Array after sort



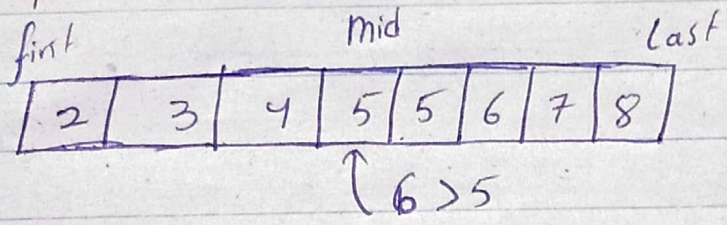
Question # 02 (B):

- Binary search

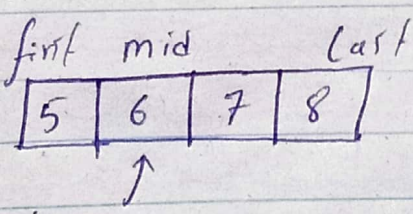
2, 3, 4, 5, 5, 6, 7, 8

Target = 6

step 1



step 2



In this case,

```
(dat[index] == value)
    return index;
```

Question # 2(c):-

- for big O of following code

```
for (i=1 to 5N)
    for (j=1 to 6m)
        print("hello")
```

solution,

Big O notation for the above Code is

$O(m * N)$.