3. The following code is for the Partition method used by the QUICKSORT algorithm:

```
procedure PARTITION(A, p, r)
    x ← A[r]; i ← p − 1
    for j ← p to r − 1
do if A[j] ≤ x
    then i ← i + 1
return i + 1
```

Suppose that PARTITION(A, 1, 6) is called over the array $A = [8, 4, 2, 7, 1, 5]$ (assuming the array indexes from 1). What is the result?

(a) $A = [4, 2, 1, 5, 8, 7]$ and 4 is returned.
(b) $A = [1, 2, 4, 5, 7, 8]$ and 5 is returned.
(c) $A = [4, 2, 1, 5, 8, 7]$ and 5 is returned.
(d) $A = [4, 2, 1, 5, 7, 8]$ and 4 is returned.

4. A deque (double-ended queue) is implemented using an array called `items` and left and right indices called `left` (an index to the leftmost item) and `right` (an index to the rightmost item) respectively. The deque is cyclic (or “wraps around”) so that all space in the array can be used.

The method `pushLeft` adds an item to the left end of the deque and is implemented as follows:

```
public void pushLeft(char c) throws Overflow {
    if (!isFull()) {
        << missing code >>
    }
    else throw new Overflow('Pushing to full deque'.)
}
```

Which of the following is a correct implementation of the missing lines:

(a) `left = (left-1)%items.length; items[left] = c;`
(b) `left = (left+1)%items.length-1; items[left] = c;`
(c) `left = left-1;
    if (left==right+1) left = (left-1)%items.length;
    items[left] = c;`
(d) `left = left-1;
    if (left == -1) left = items.length-1;
    items[left] = c;`
Ans 3
\[ \nu = 8 \]
\[ A[6] = 5 \]
\[ i = 0 \]

For \( j = 1 \) to 5

\[ j = 1 \]
\[ A[j] = 8 \]
\[ \text{So } A[6] \text{ will fail} \]
\[ \text{No change to } A, i \]

\[ j = 2 \]
\[ A[j] = 2 \]
\[ u \rightarrow v \]
\[ i = 1 \]
\[ i \leftrightarrow 2 \]
\[ A = [4, 8, 2, 7, 1, 5] \]

\[ j = 3 \]
\[ A[j] = 2 \]
\[ u \rightarrow v \]
\[ i = 2 \]
\[ A = [4, 2, 8, 7, 1, 5] \]

\[ j = 4 \]
\[ A[j] = 7 \]
\[ v \rightarrow u \]

\[ j = 5 \]
\[ A[j] = 1 \]
\[ u \rightarrow v \]
\[ i = 3 \]
\[ A = [4, 2, 1, 5, 8, 7, 1, 5] \]

(9) is correct
\[ A = [4, 2, 1, 5, 8, 7, 1, 5] \]
\[ \text{Ref. } (i+1) = 4 \]