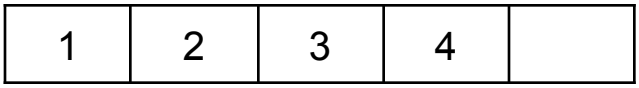
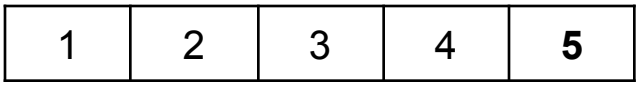
Question 1.
Array size is the number of cells that have any data within them, while capacity is just the overall number of cells.

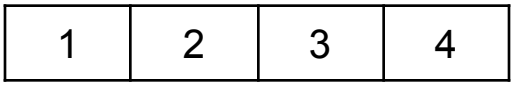
Question 2.
For example, take this array with four elements.



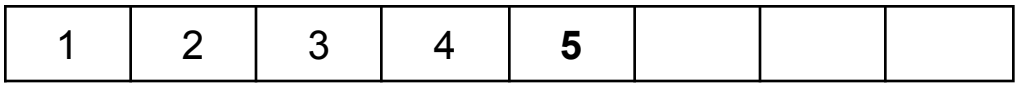
In this case where the array has enough capacity to add another element, the size of the array will just be increased from 4 to 5.



If the array's length matches its full capacity and in this case can only hold 4 elements like shown.



The array will need to be reallocated with enough capacity to add another element. To do this a new array will be created with more capacity than the old array. Then the new array will copy over each item from the old array and add the new element at the end.



This process will incur at a O(n) cost.

Question 3.

A way to amortize the cost of expanding an array is called the aggregate method. This method firstly determines the worst case cost of the entire sequence by summing up each operation cost. Once we have the sum you would then divide the cost by the total number of operations.