Worksheet: Arrays Practice

1. Write the statement that will declare a variable and initialize it to an array:

a)	of five integers and initialize it with values `1` through `5`	`int[] arr = { 1, 2, 3, 4, 5 };`
b)	of ten `doubles`, all initialized to `0.0`	`double[] arr = new double[10];`
c)	of `String` array containing three English names	`String[] arr = { "Adam", "Bill", "Zoe" };`

2. Write a `for` loop that changes every element in an array, `arr`, to its square.

```
1 for(int i = 0; i < arr.length; i++) {
2    arr[i] *= arr[i];
3 }
```

3. Write an **enhanced `for`** loop that prints all the elements of an array, `arr`, in order.

```
1 for(int x: arr) {
2    System.out.print(x + " ");
3 }
```

4. Write a `for` loop that prints all the elements of an array, `arr`, in reverse order.

```
1 for(int i arr.length-1; i>=0; i--) {
2    System.out.println( arr[i] );
3 }
```

5. Write a `for` (not enhanced `for`) loop that calculates a sum of all the elements of `arr`, an array of `double`.

```
1 double sum = 0;
2 for(int i = 0; i < arr.length; i++) {
3    sum += arr[i];
4 }
```

6. Write an **enhanced `for`** loop that calculates an average of all the elements of `arr`, an array of `double`.

```
1 double avg = 0;
2 for(int x : arr) {
3    avg += x;
4 }
5 avg /= arr.length;
```

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7. Write code that will shift all elements in an array, `arr`, one position to the left, with the first element becoming the last. You can assume the precondition that the array has at least one element.

```
1 int first = arr[0];
2 for(int i = 0; i < arr.length-1; i++) {
3  arr[i] = arr[i+1];
4 }
5 arr[ arr.length-1 ] = first;
```

8. Fill in the trace table for the code. Then on the lines below, explain what the code does to the array.

```
int[] arr = { 3, 8, -1, 2, 6 };
int last = arr [ arr.length-1 ];
for(int i=arr.length-1; i>=1; i--)
{
   arr[i] = arr[i-1];
}
arr[0] = last;
```

		arr[i]				
last	i	0	1	2	3	4
		3	8	-1	2	6
6	4	3	8	-1	2	2
6	3	3	8	-1	-1	2
6	2	3	8	8	-1	2
6	1	3	3	8	-1	2
6	0	6	3	8	-1	2

b) Explain what the code above does to the array.

The code will shift all elements in an array, arr, one position to the right, with the first element becoming the last.

c) Explain what would happen if the `for` loop condition was: `i>=0`

The loop would be entered with `i=0`*, and the code* `arr[i-1]` *would try to read* `arr[-1]`*, resulting in an* `ArrayIndexOutOfBounds` *exception.*

9. Write method `swap` that will swap the position of two elements of the array. This method is to have no return value, and take three parameters: the integer array containing the elements to swap, and the two indexes of the elements to swap.

```
1 public static void swap(int[] a, int i, int j) {
2    int n = a[i];
3    a[i]=a[j];
4    a[j]=n;
5 }
```