

Arrays

Array indexes always start at zero and continue to (array length - 1). Can you notice the mistake in the following code?

```
int[] values = new int[3];

for (int index = 0; index < 4; index++)
{
    System.out.println("Now processing element " + index);
    values[index] = 10;
}
```

The loop will process elements 0, 1, 2, and 3. However, our array only has 3 values (elements 0, 1, & 2). Below is the correct code:

```
int[] values = new int[3];

for (int index = 0; index < 3; index++)
{
    System.out.println("Now processing element " + index);
    values[index] = 10;
}
```

A very common error is have an off-by-one error, such as the code below:

```
// This code has an off-by-one error.
int[] numbers = new int[100];
for (int i = 1; i <= 100; i++)
{
    numbers[i] = 99;
}
```

This will result in an `ArrayIndexOutOfBoundsException`:

This is most common because we forget that array elements start at 0. The corrected code is below:

```
// This code has an off-by-one error.
int[] numbers = new int[100];
for (int i = 0; i <= 99; i++)
{
    numbers[i] = 99;
}
```

Now for some practice. The following program is supposed to store the top 20 scores of a video game. Then, it gives the user the option to print out the top 3, top 5, top 10, or top 20 lists. Can you fix all of the errors to get it working properly?

Save this project as 'VGTopScores'

```

import java.util.Scanner;

public class VGTopScores
{
    public static void main(String[] args)
    {
        Scanner keyboard = new Scanner(System.in);
        int[] score = {5678, 5432, 5275, 5098, 5045, 5042, 4965, 4765, 4698, 4645,
4609, 4601, 4555, 4432, 4390, 4389, 4321, 4286, 4222, 4210};

        System.out.println("Which list would you like to see?");
        System.out.println("Enter 1 for Top 3");
        System.out.println("Enter 2 for Top 5");
        System.out.println("Enter 3 for Top 10");
        System.out.println("Enter 4 for Top 20");
        int choice = keyboard.nextInt();

        if(choice == 1)
        {
            for(int i = 1; i < 2; i++)
            {
                System.out.println("#" + (i + 1) + ": " + score[i+1]);
            }
        }
        else if(choice == 2)
        {
            for(int i = 0; i < 6; i++)
            {
                System.out.println("#" + (i + 1) + ": " + score[i]);
            }
        }
        else if(choice == 3)
        {
            for(int i = 1; i <= 10; i++)
            {
                System.out.println("#" + (i + 1) + ": " + score[i-1]);
            }
        }
        else if(choice == 4)
        {
            for(int i = 0; i <= 21; i++)
            {
                System.out.println("#" + (i + 1) + ": " + score[i]);
            }
        }
        else
        {
            System.out.println("You entered an incorrect value");
        }
    }
}

```

Save this project as 'VGTopScores'