Common Array Bugs

```
int sum = 0;
int numDays = console.nextInt();

int[] temperatures = new int[numDays];

for (int i = 0; i < numDays; i++) {
    temperatures[i] = console.nextInt();
    sum += temperatures[i];
}

double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i < temperatures.length; i++) {
    if (temperatures[i] > average) {
        aboveAvg++;
    }
}
```

```
int sum = 0;
int numDays = console.nextInt();

int[] temperatures = new int[numDays];

for (int i = 0; i < numDays; i++) {
    temperatures[i] = console.nextInt();
    sum += temperatures[i];
}

double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i < temperatures.length; i++) {
    if (temperatures[i] > average) {
        aboveAvg++;
    }
}
```

Declaring variable of type **`int[]`** with the name **`temperatures`**
Variable **`temperatures`** will hold the reference to our array

Initializing a new **`int[]`** of length **`numDays`**
All elements initialized to 0

Set for loop bounds so that the loop variable **`i`** that we are accessing in **`temperatures[i]`** goes through the values 0, 1, 2, ..., **`numDays`** - 1 because those are exactly the valid indices in the array **`temperatures`**

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 1; i < temperatures.length; i++) {
    if (temperatures[i] > average) {
        aboveAvg++;
    }
}
```

Bug: missing some values, so our above average might not be correct

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 1; i < temperatures.length; i++) {
    if (temperatures[i] > average) {
        aboveAvg++;
    }
}
```

For loop bounds make the loop variable **i** that we are accessing in **temperatures[i]** go through the values 1, 2, ..., **temperatures.length** - 2
so we miss index 0 (first element) and index **temperatures.length** - 1 (last element) in the array **temperatures**

How could we fix this?

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i <= temperatures.length; i++) {
    if (temperatures[i] > average) {
        aboveAvg++;
    }
}
```

Bug: accessing illegal index of the array

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i <= temperatures.length; i++) {
    if (temperatures[i] > average) {
        aboveAvg++;
    }
}
```

For loop bounds make the loop variable **`i`** that we are accessing in **`temperatures[i]`** go through the values 0, 1, 2, …, **`temperatures.length`** so we attempt to access an invalid index **`temperatures.length`** (past the last element) in the array **`temperatures`**

How could we fix this?

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i < temperatures.length; i++) {
    if (i > average) {
        aboveAvg++;
    }
}
```

Bug: specifying index without specifying array

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i < temperatures.length; i++) {
    if (i > average) {
        aboveAvg++;
    }
}
```

The loop variable represents which index we want to access, but we didn't specify an array or index into it
We aren't actually looking at the elements in the **`temperatures`** array

How could we fix this?

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i < temperatures.length; i++) {
    if (temperatures > average) {
        aboveAvg++;
    }
}
```

Bug: specifying array without specifying index

```
double average = 1.0 * sum / numDays;
int aboveAvg = 0;

for (int i = 0; i < temperatures.length; i++) {
    if (temperatures > average) {
        aboveAvg++;
    }
}
```

`temperatures` is the array we want to access but we didn't specify which index we want to access
We are trying to compare the array itself to the double scalar **`average`** and aren't actually looking at the elements in the **`temperatures`** array

How could we fix this?