

CS 1110 Assignment 8

1. Out of Memory

Name: NoMemory.java

Similar to Exception, there is an Error class. While Exception and its subtypes represent problems that could potentially be handled and recovered from, Error and its subtypes represent issues that are so severe they probably shouldn't be attempted to be caught / handled. One specific type of error is OutOfMemoryError, which indicates the JVM doesn't have a sufficient amount of memory available to do some operation.

Write a program that produces an OutOfMemoryError.

Hint: Think about large strings and large arrays.

Sample Run:

```
Exception in thread "main" java.lang.OutOfMemoryError: Java heap space
    at NoMemory.main(NoMemory.java:11)
```

2. Array Bounds

Name: `ArrayBounds.java`

Write a program that creates an array of 10 integers with each integer being of a random value. Ask the user to enter an index and display the array element at that index. Use exception handling (i.e., try catch statement) to catch exceptions that arise when the user enters something of the incorrect data type (`InputMismatchException`) or an index is out of bounds (`IndexOutOfBoundsException`). Your handling of these two exceptions should simply print out a message stating what went wrong (see sample runs).

Note that you may need to import `java.util.InputMismatchException`.

Sample Runs:

```
Enter an index: -1
Index out of bounds
```

```
Enter an index: hello
Incorrect data type
```

```
Enter an index: 5
Value at index is: 9
```

```
Enter an index: 5
Value at index is: 62
```

3. Keeping It Real

Name: KeepReal.java

Taking the square root of a negative number does not produce a real number, but rather an imaginary number.

Create a method called `squareRoot()`. Here's part of the method signature:

```
double squareRoot(double x)
```

If the input is positive, use `Math.sqrt()` to calculate and return the square root. However, if `x` is negative, throw an `IllegalArgumentException`.

Write a program that gets a number from the user and passes that number into `squareRoot()` and displays the result. Use a try catch to handle `IllegalArgumentException` by printing out that the input is invalid and displaying the exception's message (i.e., `getMessage()`).

Sample Runs:

```
Enter a number: 2.0
squareRoot(2.0) = 1.4142135623730951
```

```
Enter a number: -2.0
Invalid input: x is negative: -2.0
```

```
Enter a number: -99.9
Invalid input: x is negative: -99.9
```