5. **Exceptions and Generics**

(a) Exceptions can be used in the Java programming language to allow programmers to detect and gracefully handle errors.

i. Explain the difference between *checked* and *unchecked* exceptions. Define two exception classes, a checked exception called `ParseException` and an unchecked exception called `PrintException`. A single constructor method for each will be sufficient. [5]

ii. You are using the following code in your application:

```
public class UtilFunctions {
    public static int stringToInt(String input)
                                throws ParseException {
        ...
    }
    ...
}
```

Describe, with an example how you would use the `stringToInt` function in your code. [3]

(b) Describe the main motivating factors behind using Generics in the Java programming language. [4]

(c) Rewrite the following data structure using Java generics (You may ignore any potential errors that result from exceeding the size of the array). [4]

```
public class Array {
    private Object[] values;
    private int counter;
    public Array(int size) {
        values = new Object[size];
        counter = 0;
    }
    public void add(Object o) {
        values[counter++] = o;
    }
    public Object get(int i) {
        return values[i];
    }
}
```