Midterm #1 Sample Questions

Note: this does not represent the number of questions in the actual exam
(the actual exam will be slightly longer, by about 2 or 3 problems)

1. Create a program that gives back every other element in an Array. (7 points)

   (a) Create a method called **`everyOther`**
      i. it should take an Array of ints and return a new Array of ints
      ii. the resulting Array should consist of every other element of the Array passed in, starting with the first element

   (b) Create a **`main`** method that uses your everyOther method
      i. Create three Arrays initialized with the following values
         A. `4, 5, 6, 7, 8, 9`
         B. `5, 0, 5`
         C. an empty Array!
      ii. Call your method three times for each Array
      iii. Convert the result of each method call into a String using the `Arrays.toString` method (assume that the import is already done)
      iv. Print out the result... the output should match what's on the left side of the arrows
         A. `4, 5, 6, 7, 8, 9` `[4, 6, 8]`
         B. `5, 0, 5` `[5, 5]`
         C. an empty Array! `[]`

2. Complete the chart below:

Decimal	Binary	Hexadecimal
180	10110100	
		FF

3. What are the types of the following literal values? (2 points)

`250` _____ `250.0` _____

`'A'` _____ `"A"` _____

4. **Circle**, **correct** and **label** with a letter (a – h) at least **8 errors** in the code below and describe **why there is an error** (there are more than 8) in the corresponding lines below. (8 points)

In a file called `Foo.java`

```
public class MyFoo {

      public static void main(args) {

            int[] numbers = [20, 30, 40, 50];
            for(int i = 0, i < numbers.size(), i++) {
                  int result = (int) half(i);
                  System.out.println("half of %s is %s", half(i))
            };

            last_result = result;
            System.out.println("last result was " + result);
      }

      public static int half(int n) {
            return n / 2;
      }

      public static double half(int n) {
            return n / 2.0;
      }
}
```

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

(f) _____

(g) _____

(h) _____

5. Name the two methods in the `Character` class that you could use in #7 – or name any other two methods in the `Character` class. (1 point)

   (a) _____ (b) _____

6. What's the difference between a `while` loop and a `do while` loop? When would you use one over the other? (1 point)

7. Write a program that asks a user for a single character. (7 points)

   (a) If the input is more than one character, say: `What!?`
   (b) ... if it's a letter, say: `It's a letter!`
   (c) ... if it's a number say: `It's a number!`
   (d) As part of your implementation, **create two methods**, `isNumeric` and `isAlpha`;
      i. both should return `true` or `false`
      ii. you can choose whatever method signature you like
   (e) **Do not use any methods in the `Character` class** (there are specifically two methods that do exactly the same thing!)

   Example output:

```
Please enter a character
> 2
It's a number!

Please enter a character
> A
It's a letter!

Please enter a character
> ?
What!?
```

8. What is the output of the following code? Error is possible. If there's an error, explain why. (4 points)

Code	**Output**

int i = 20;
byte b = 20;
syso(i + b);	

`char ch = '\u0041';` `syso(ch);`	
`float myFloat = 2.0;` `syso(5 / myFloat);`	

`int[] arr1 = new int[5];`
`boolean[] arr2 = new boolean[5];`
`syso(arr1[0]);`
`syso(arr2[0]);`	

9. Numbers, numbers, num-BERS. Write the program specified below. (6 points)

   (a) Ask the user for 10 numbers
   (b) Output the largest number and the smallest number entered
   (c) Output all of the numbers in reverse order at the end
   (d) You can assume:
      i. That there's already a class and `main` method defined
      ii. ...and `Scanner` is already imported and is available
   (e) Example output (everything after the > is user input)

```
10 Numbers PUHLEASE > 5 6 8 1 2 10 100 -2 3 3
Largest: 100
Smallest: -2
In reverse: 3 3 -2 100 10 2 1 8 6 5
```

10. What are the results of the following boolean expressions? (2 points)

(a) _____ `(1 > 2 || true)`

(b) _____ `(true && false || true && false)`

(c) _____ `("hello".charAt(0) > 'z')`

(d) _____ `("hi".equals("hi") ^ Integer.parseInt("2") == 2)`

11. Let's talk about types!

(a) Name 3 primitive types, what they represent, and their size. (5 points)

Type	**Size**	**Description**

(b) Why is knowing the type and size of a variable important?

12. **YES. PATTERNS!** Create the pattern below using nested for loops. (5 points)

(a) Hint: Each number is a square (squares in a triangle? OK.)!
(b) Each column is three characters wide which accounts for:
   i. double digit squares, such as 81, and the space that follows the number
   ii. (obviously for the squares that are single digits, pad with two spaces on the left)

```
81 64 49 36 25 16  9  4  1
   64 49 36 25 16  9  4  1
      49 36 25 16  9  4  1
         36 25 16  9  4  1
            25 16  9  4  1
               16  9  4  1
                   9  4  1
                      4  1
                         1
```

13. Answer the following questions about the code in the left-most column. (6 points)

(a) All of the code is in the main method of a Java program
(b) Assume that a Scanner object named `input` exists
(c) Lastly, `System.out.println` has been **abbreviated** to **`syso`**.

Code	**Question #1**	**Question #2**

`syso("Please enter a word:");`
`String s = input.next();`
`int lastIdx = s.length() - 1;`
`char ch = s.charAt(lastIdx);`
`ch -= 1;`
`syso(ch);`
	Assume that the user types in **`BUZZ`**. What is the output of this code? Error is possible.	What is the value of `s.length()`? Why is `1` subtracted from it?

`// tricky!`
`Scanner(System.in);`
`syso("Want a greeting?");`
 	
`String s = input.next();`
 	
`if(s.equals("yes")) {`
`  String response = "Hello!";`
`} else {`
`  String response = ":(";`
`}`
`syso(response);`
	Assume that the user types in **`yes`**. What is the output of this code? Error is possible.	Why is the method, `equals`, used to check if one string is equal to another (instead of `==`)?

`syso("How many slices?");`
`int n = input.nextInt();`
`  switch(n) {`
`    case 1:`
`      syso("one for you");`
`      break;`
`    case 2:`
`      syso("two-zy!");`
`    case 3:`
`      syso("take it all!");`
`}`
	Assume that the user types in **`1`**. What is the output of this code?	Assume that the user types in **`2`**. What is the output of this code?

14. Write a short code example and draw a diagram that demonstrates activation records and the call stack. (3 points)