CS 1083

# Module 7 Assignment

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## Part A: Greatest Common Divisor:

**Source code:**

```
/**
 * @author Ngoc Phuong Anh Nguyen - 3712361
 */
public class GreatestCommonDivisor
{
    public static int gcd(int x, int y)
    {
        if(y == 0)
        {
            return x;
        }
        return gcd(y,x%y);
    }

    public static int gcd(int x, int y, String indent)
    {
        if(y == 0)
        {
            System.out.println(indent + "Returning: "
                        + gcd(x,y) + " from gcd(" + x + "," + y + ")");
            return x;
        }
        System.out.println(indent + "Calling: gcd(" + y + "," + x%y + ")");
```

```
    gcd(y,x%y,indent + "\t");
    System.out.println(indent + "Returning: "
                + gcd(x,y) + " from gcd(" + x + "," + y + ")");

    return gcd(y,x%y);
}

public static void main(String[] args)
{
    int x,y;
    System.out.println("x \t y\tgcd(x,y)\n" + "==\t==\t========");
    for(int i = 0; i < 10; i++)
    {
        x = (int)(Math.random() * (20 - 5 + 1)) + 5;
        y = (int)(Math.random() * (20 - 5 + 1)) + 5;
        System.out.println(x +"\t" + y + "\t" + gcd(x,y));

    }

    for(int i = 0; i < 2; i++)
    {
        x = (int)(Math.random() * (20 - 5 + 1)) + 5;
        y = (int)(Math.random() * (20 - 5 + 1)) + 5;

        System.out.println("\n***** " + "gcd(" + x + "," + y + ") *****");
        System.out.println("***** RESULT: " + gcd(x,y,"") + " *****");
```

```
        }
    }
}
```

**Output:**

**Case 1:**

```
x     y   gcd(x,y)
==    ==  ========
12    16  4
10    9   1
20    11  1
12    19  1
9     6   3
7     20  1
14    16  2
7     5   1
16    6   2
18    17  1

***** gcd(18,15) *****
Calling: gcd(15,3)
     Calling: gcd(3,0)
          Returning: 3 from gcd(3,0)
     Returning: 3 from gcd(15,3)
Returning: 3 from gcd(18,15)
```

```
***** RESULT: 3 *****

***** gcd(19,7) *****
Calling: gcd(7,5)
     Calling: gcd(5,2)
          Calling: gcd(2,1)
               Calling: gcd(1,0)
                    Returning: 1 from gcd(1,0)
               Returning: 1 from gcd(2,1)
          Returning: 1 from gcd(5,2)
     Returning: 1 from gcd(7,5)
Returning: 1 from gcd(19,7)
***** RESULT: 1 *****
```

**Case 2:**

| x | y | gcd(x,y) |
|---|---|---|
| 12 | 5 | 1 |
| 19 | 15 | 1 |
| 17 | 6 | 1 |
| 11 | 17 | 1 |
| 13 | 16 | 1 |
| 7 | 10 | 1 |
| 7 | 6 | 1 |
| 10 | 12 | 2 |

```
6    11   1
7    8    1

***** gcd(8,16) *****
Calling: gcd(16,8)
     Calling: gcd(8,0)
          Returning: 8 from gcd(8,0)
     Returning: 8 from gcd(16,8)
Returning: 8 from gcd(8,16)
***** RESULT: 8 *****

***** gcd(18,16) *****
Calling: gcd(16,2)
     Calling: gcd(2,0)
          Returning: 2 from gcd(2,0)
     Returning: 2 from gcd(16,2)
Returning: 2 from gcd(18,16)
***** RESULT: 2 *****
```

## Part B: Palindromes

**Source code:**

```
import static java.lang.Character.isLetter;

/**
 * @author Ngoc Phuong Anh Nguyen - 3712361
 */
public class Palindromes
{
    public static boolean isPalindrome(String s)
    {
        String temp = s.toLowerCase();
        String clean = "";
        for(int i = 0; i < s.length(); i++)
        {
            if(isLetter(temp.charAt(i)) == true)
            {
                clean += temp.charAt(i);
            }
        }
        return isPalindrome(clean,0);
    }

    private static boolean isPalindrome(String s, int index)
    {
```

```
    if(index == s.length() - index)
    {
        return true;
    }
    if(s.charAt(index) != s.charAt(s.length() - 1 - index))
    {
        return false;
    }
    if(index < s.length() - index - 1)
    {
        return isPalindrome(s, index + 1);
    }
    return true;
}
public static void main(String[] args)
{
    String s[] = {"radar", "a", "","Able was I ere I saw Elba", "A man, a plan, a canal,
                    Panama!",
                   "Borrow or rob?", "Was it a cat I saw?",
                   "lavender", "rose", "lily", "chemistry"};

    for(int i = 0; i < s.length; i++)
    {
        if(isPalindrome(s[i]))
        {
            System.out.println("Yes!\t\"" + s[i] + "\"");
```

```
            }
            else
            {
                System.out.println("No...\t\"" + s[i] + "\"");
            }
        }
    }
}
```

**Output:**

```
Yes!    "radar"
Yes!    "a"
Yes!    ""
Yes!    "Able was I ere I saw Elba"
Yes!    "A man, a plan, a canal, Panama!"
Yes!    "Borrow or rob?"
Yes!    "Was it a cat I saw?"
No...   "lavender"
No...   "rose"
No...   "lily"
No...   "chemistry"
```