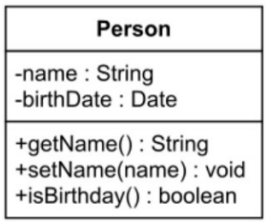
CS163/CS164 – Worksheet Week 3 – Loops, Javadoc, UML

Names: _____

1. Use the UML class diagram presented below to identify the class name, attributes, and methods. Indicate the visibility of the attributes and methods.



Class name: Person
Attributes: String name – private, Date birthdate – private
Methods: getName() , setName(name), isBirthday() all methods are public

2. Use the Javadocs descriptions provided in the code below to implement the methods and make the correct calls in main.

```
import java.util.Scanner;

public class WSWeek3 {
    /**
     * Main method used to call other methods
     * @parameter String args[]
     */
    public static void main(String args[]){
        //Creates a Scanner object named in by calling the Scanner
        //constructor and passing System.in as the parameter
        Scanner in = new Scanner(System.in);
        //call maxMin method passing in as a parameter
        minMax(in);
        //since factorial receives a parameter, we need to read an int
        //number to pass as the parameter
        //if the number is negative, we transform to a positive
        //since factorial returns a value, we need to call it
        //inside a System.out.println or store it in a variable.
        //int fac = factorial(num);
        System.out.println("Enter a number:");
        int num = in.nextInt();
        if(num < 0)
            num *= -1;
        System.out.printf("%d! = %d\n", num, factorial(num));

        //read the number to call perfect
        //since perfect return true or false, you need to have
        //an if to test and print the correct message
        System.out.print("Enter a number to verify perfect number: ");
        num = in.nextInt();
        if(perfect(num))
            System.out.printf("%d is a perfect number\n", num);
        else
            System.out.printf("%d is NOT a perfect number \n", num);
    }
```

```java
/**
 * minMax method
 * Asks the user to enter the total number to be read.
 * Determines and print the min and max of the numbers read.
 * @param in
 */
// Possible algorithm to solve that problem:
// 1 - declare your variables and initialize them
// 2 - read the total of number that will be entered
// 3 - have a loop that starts on 0 and do until < total
// 4 - inside the for loop
// 5 - read a number
// 6 - if the number is the first read - initialize min and max with
//     that number
// 7 - if num < min - update min
// 8 - if num > max - update max
// 9 - prints the min and max outside of the loop

public static void minMax(Scanner in){
    int total = 0, min = 0, max =0;
    System.out.print("Enter the amount of numbers that will be read: ");
    total = in.nextInt();
    for(int i = 0; i < total; i++){
        System.out.print("Enter a number: ");
        int num = in.nextInt();
        if(i == 0){
            min = num;
            max = num;
        }
        if(num < min)
            min = num;
        if(num > max)
            max = num;
    }
    System.out.printf("Min: %d Max: %d\n", min, max);
}

/**
 * factorial method
 * calculates the factorial of a number
 * @param num - number to calculate the factorial
 * @return factorial of num
 */
//Possible algorithm to solve this problem:
//1 - test if num == 0 return 1
//2 - declare and initialize fat variable with num
//3 - use a while loop num > 1
//4 - update num, by decrementing 1
//5 - fat = fat * num or fat *= num
//6 - out of the loop - return fat
public static int factorial(int num){
    if(num == 0) return 1;
    int fat = num;
    while(num > 1){
        num--;
        fat = fat * num;
    }
```

```
        return fat;
    }

    /**
     * perfectNumber method
     * verifies if a number is a perfect number.
     * A perfect number is a positive integer that is equal to the
     * sum of its positive divisors, excluding the number itself.
     * For instance, 6 has divisors 1, 2 and 3 (excluding itself),
     * and 1 + 2 + 3 = 6, so 6 is a perfect number.
     * @param num
     * @return boolean - true if num is a perfect number, false otherwise
     */
    //Possible algorithm to solve this problem:
    // 1 - if num is zero, return false
    // 2 - if num is negative, transform to a positive number
    // 3 - initialize your div variable with 1 (first divisor)
    // 4 - do a loop starting on 2 and going <= num/2 (which is the second
great divisor of the number)
    // 5 - inside the loop test if num % i == 0 add i to div, since i is a
divisor of num
    // 6 - outside the loop test if div == num return true, return false
otherwise
    public static boolean perfect(int num){
        if(num == 0) return false;
        if(num < 0) num *= -1;
        int div = 1;
        for(int i = 2; i <= num/2; i++){
            if(num % i == 0)
                div = div + i;
        }
        if(div == num)
            return true;
        return false;
    }
}
```