**44-542 Object Oriented Programming**

**Lab02: Classes Lab Activity**

**Objective:** Covers the creation and usage of **Class**, **Constructors**, **getter** and **setter** methods, and **Scanner** class

**NOTE:**

* Do not hard code any values.
* Do not use any conditional or looping statements for this lab.
* Check the sample output to know how the results need to be printed.
* Read every instruction carefully and follow them strictly.
* Do not change the name of the attributes, method given below.

1. Create a New Project and name it as **Lastname\_Lab02Classes** where **Lastname** is your last name.
2. Create a new package in the project created and name it as **professors**.
3. Create a new Java class in **professors** package and name it as **Professor**.
4. Write statements to declare the following attributes. Do not add any instance variables beyond those shown here. Access specifiers must be private for all the given instance variables.

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| --- | --- | --- |
| **Attributes** | **Type** | **Attribute Description** |
| **firstName** | **String** | First name of the professor |
| **lastName** | **String** | Last name of the professor |
| **professorID** | **int** | ID of the professor |
| **phoneNumber** | **String** | Phone number of the professor |
| **address** | **String** | Address of the professor |

1. Constructor:
   1. Create one constructor with parameters. The parameters are used to set the values of the instance variables.

**public Professor(String firstName, String lastName, int professorID, String phoneNumber, String address)**

* 1. Create one no-argument constructor with an empty body.

1. Methods:
   1. Write **getter and setter** method for each of the instance variables declared.
   2. Write a **toString()** method which should be used to display the values for each attribute. This method should return a String. Please see the sample output to know the pattern.
2. Create a new Java Main class in **professors** package and name it as **ProfessorDriver**. Use (Copy and paste) the below given code in your main method to test your Professor class functionality.

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| // created the professor object with 4 argument constructor  Professor profObject01 = new Professor("Michael","Downey",50988,"6602240486", "9277 Fairway Drive, Apt#208, Des Plaines, IL");  System.out.println("Professor Details01");  System.out.println("Professor ID: "+profObject01.getProfessorID());  System.out.println("Name: " + profObject01.getFirstName() +" "+ profObject01.getLastName());  System.out.println("Address: "+profObject01.getAddress());  System.out.println("Contact Number: "+profObject01.getPhoneNumber());  System.out.println("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n");  // created the professor object with no-argument constructor  Professor profObject02 = new Professor();  System.out.println("Professor Details02");  System.out.println("Professor ID: "+profObject02.getProfessorID());  System.out.println("Name: " + profObject02.getFirstName() +" "+ profObject02.getLastName());  System.out.println("Address: "+profObject02.getAddress());  System.out.println("Contact Number: "+profObject02.getPhoneNumber());  System.out.println("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n");  // now set the value of attributes for the profObject02  profObject02.setProfessorID(12354);  profObject02.setFirstName("Julie");  profObject02.setLastName("Clark");  profObject02.setPhoneNumber("9494949494");  profObject02.setAddress("1231 University Drive, Apt#60, Kansas, MO");  System.out.println("Testing toString() method of Professor class:\n"+profObject02.toString()); |

1. Using the above Driver class code and explain why **profObj02** prints all Professor details as null for **String** and 0 for **Int** type instance variables. Demonstrate the explanation using comments. Verify your output with below given sample output.
2. Create a new Java Class in **professors** package and name it as **ProfessorSalary**.
3. Write statements to declare the following attributes. Do not add any instance variables beyond those shown here. Access specifiers must be private for all the given instance variables.

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| --- | --- | --- |
| **Attributes** | **Type** | **Attribute Description** |
| **hourlyRate** | **double** | Hourly pay rate of the professor |
| **bonus** | **double** | Bonus amount per annum |
| **insuranceRate** | **double** | Insurance percentage |
| **taxRate** | **double** | Tax percentage |
| **HOURS** | **int** | Total hours of work per week(constant), initialize with 40 |

1. Constructor:
   1. Create one constructor with parameters, with the following prototype. The parameters are used to set the values of the instance variables.

**public ProfessorSalary(double hourlyRate, double bonus, double insuranceRate, double taxRate)**

* 1. Create one no-argument constructor .

1. Methods:
   1. Write a get() and set() method for each of the instance variables declared. The set() methods do not return any value. The get() methods return the same type which is used for declaring the attributes. Use the standard naming convention.
   2. Write a method for calculating the monthly salary of the professor. Name the method as monthlySalary(). It must return a double value.

**Hint:**

* Calculate based on number of weekly hours provided.
* Assume there are 4 weeks in a month.

***If the hourly pay rate of the professor is $24.5, and then his monthly salary should be $3920.0.***

* 1. Write a method for calculating the monthly insurance. Name the method as monthlyInsurance(). It must return a double value.

**Hint:**

* Calculate based on number of weekly hours provided.
* Assume there are 4 weeks in a month.

***If the hourly pay rate of the professor is $24.5, insurance is 12.5%, and then his monthly insurance should be $490.0.***

* 1. Write a method for calculating the annual salary. Name the method as **annualGrossSalary()**. It must return a double value.

***If the hourly pay rate of the professor is $24.5, annual bonus added to his annual income is 3875.9 and then his annual salary should be $*** ***50915.9***

* 1. Write a method for calculating the annual net pay. Name the method as **annualNetPay().** It must return a double value.

***If the hourly pay rate of the professor is $24.5, tax exempted is 9.25%, on annualGrossSalary, insurance deducted is 12.5% on his annual salary (Excludes Bonus) then his annual Net pay should be $*** ***40326.17925***

* 1. Write a toString() method which should be used to display the values for each attribute. This method should return a String. Please see the sample output for knowing the pattern.

1. Include Javadoc comments for each constructor, and method in **Professor** and **ProfessorSalary** class using **@author**, **@param**, and **@return** annotations when appropriate. Remember that for each method, the first line of the Javadoc comment should be a brief description of the method.
2. Generate documentation for your project by clicking on **Run** from the NetBeans menu bar and then selecting **Generate Javadoc**. The documentation will be placed in a **javadoc** subfolder of the **dist** subfolder inside your project folder. You can view the documentation created by opening **index.html**.
3. Go to **ProfessorDriver** class in **professors** package. Now do the following at the end of the same main function.
   1. Declare and initialize a Scanner object to read from the keyboard. Name it as **scObj**.
   2. Prompt the values for hourlyRate, insuranceRate, taxRate, and bonus for a Professor. Read each value using the Scanner object created in the previous step.
   3. Use the input values to create a new ProfessorSalary object named **professorSalaryObj1**
   4. Print professorSalaryObj1 using toString() method in professorSalary class.
   5. Print with appropriate labels, the values returned by monthlySalary(),monthlyInsurance(),annualGrossSalary(),annualNetPay().
   6. Create a new ProfessorSalary object and name it as **ProfessorSalaryObj2** using the no argument constructor.
   7. Print ProfessorSalaryObj2 using toString() method in ProfessorSalary class.
   8. Print with appropriate labels, the values returned by monthlySalary(),monthlyInsurance(),annualGrossSalary(),annualNetPay().
   9. Use the setter methods to set the values for hourlyRate, insuranceRate, taxRate, and bonus for a Professor as $42.85, 15.30%, 11.55% and $6344.66 respectively. Do not input these values, hard code them as parameters in the calls to the setter methods.
   10. Print ProfessorSalaryObj2 using toString() method in ProfessorSalary class.
   11. Print with appropriate labels, the values returned by monthlySalary(),monthlyInsurance(),annualGrossSalary(),annualNetPay().

Sample Output: (User input is in Red)

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| Professor Details01  Professor ID: 50988  Name: Michael Downey  Address: 9277 Fairway Drive, Apt#208, Des Plaines, IL  Contact Number: 6602240486  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Professor Details02  Professor ID: 0  Name: null null  Address: null  Contact Number: null  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Testing toString() method of Professor class:  Julie Clarkwith professorID:12354, phone number: 9494949494 and address: 1231 University Drive, Apt#60, Kansas, MO  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Testing the ProfessorSalary class:  Enter the hourly pay rate of the Professor: $24.5  Enter the insurance rate of the Professor in percentage: 12.5  Enter the tax rate of the Professor in percentage: 9.25  Enter the bonus amount: $3875.9  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Testing the toString() method of ProfessorSalary class:  Hourly pay rate: $24.5, insurance rate: 12.5%, tax: 9.25%, annual bonus: $3875.9, Hours per week: 40  The monthly salary of the Professor is: $3920.0  The monthly insurance of the Professor is: $490.0  The annual gross salary of the Professor is: $50915.9  The gross annual net pay of the Professor is: 40326.17925  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  The details of professorSalaryObj2 are as follows:  Testing the toString() method of ProfessorSalary class:  Hourly pay rate: $0.0, insurance rate: 0.0%, tax: 0.0%, annual bonus: $0.0, Hours per week: 40  The monthly salary of the Professor is: $0.0  The monthly insurance of the Professor is: $0.0  The annual gross salary of the Professor is: $0.0  The gross annual net pay of the Professor is: 0.0  \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*  Testing the toString() method of ProfessorSalary class:Hourly pay rate: $42.85, insurance rate: 15.3%, tax: 11.55%, annual bonus: $6344.66, Hours per week: 40  The monthly salary of the Professor is: $6856.0  The monthly insurance of the Professor is: $1048.968  The annual gross salary of the Professor is: $88616.66  The gross annual net pay of the Professor is: 67832.00295 |

**Submit you solution by following the steps below:**

* Save your files in NetBeans.
* Zip your entire Project. (It should be called *Lastname*\_Lab02Classes.zip where Last name is your last name.)
* Submit the Zip file to the Lab02Classes dropbox.
* Download the Zip file you have submitted.
* Look in the Zip file and verify the class files in the Zip folder are correct. If not resave your project in NetBeans and resubmit.