Set-1

Note: Program should be written (any order) in pure Groovy

1. Write a program to print the area and perimeter of a triangle having sides of 3, 4 and 5 units by creating a class named 'Triangle' with constructor having the three sides as its parameters.

2. Write a program to print the area of a rectangle by creating a class named 'Area' having two methods. First method named as 'setDim' takes length and breadth of rectangle as parameters and the second method named as 'getArea' returns the area of the rectangle. Length and breadth of rectangle are entered through keyboard.

3. Print the average of three numbers entered by the user by creating a class named ‘Average’ having a method to calculate and print the average.

4. Add two distances in inch-feet by creating a class named 'AddDistance'.

5. Write a program to print the area of a rectangle by creating a class named 'Area' having two methods. First method named as 'setDim' takes length and breadth of rectangle as parameters and the second method named as 'getArea' returns the area of the rectangle. Length and breadth of rectangle are entered through keyboard.

6. Create a class called 'Matrix' containing constructor that initializes the number of rows and number of columns of a new Matrix object. The Matrix class has the following information:

- number of rows of matrix
- number of columns of matrix
- elements of matrix in the form of 2D array

7. The Matrix class has methods for each of the following:

- get the number of rows
- get the number of columns
- set the elements of the matrix at given position (i,j)
- adding two matrices. If the matrices are not addable, "Matrices cannot be added" will be
- Displayed.
- multiplying the two matrices

8. Print the average of three numbers entered by the user by creating a class named 'Average' having a method to calculate and print the average.

9. Define a method that returns the product of two numbers entered by the user.

10. Define a program to find out whether a given number is even or odd.

11. Write a program which will ask the user to enter his/her marks (out of 100). Define a method that will display grades according to the marks entered as below:

Marks	Grade
91-100	AA
81-90	AB
71-80	BB
61-70	BC
51-60	CD
41-50	DD

<=40	Fail

12. Using recursion, define a method to know nth term of a Fibonacci series.
Nth term of the Fibonacci series is
F(n) = F(n-1)+(n-2)
F(0) = 0
F(1) = 1
F(2) = F(1)+(0) = 1+0 = 1
F(3) = F(2)+(1) = 1+1 = 2
F(4) = F(3)+(2) = 2+1 = 3

13. Define a method named 'perfect' that determines if parameter number is a perfect number. Use this function in a program that determines and prints all the perfect numbers between 1 and 1000. [An integer number is said to be "perfect number" if its factors, including 1(but not the number itself), sum to the number. E.g., 6 is a perfect number because 6=1+2+3].

14. Write a program that takes as input your gross salary and your total savings and uses another function named taxCalculator() to calculate your tax. The taxCalculator() function takes as parameters the gross salary as well as the total savings amount. The tax is calculated as follows:
(a) The savings is deducted from the gross income to calculate the taxable income. Maximum deduction of savings can be Rs. 100,000, even though the amount can be more than this.
(b) For up to 100,000 as taxable income the tax is 0 (Slab 0); beyond 100,000 to 200,000 tax is 10% of the difference above 100,000 (Slab 1); beyond 200,000 up to 500,000 the net tax is the tax calculated from Slab 0 and Slab 1 and then 20% of the taxable income exceeding 200,000 (Slab 2); if its more than 500,000, then the tax is tax from Slab 0, Slab 1, Slab 2 and 30% of the amount exceeding 500,000.

15. Create a class named 'Rectangle' with two data members 'length' and 'breadth' and two methods to print the area and perimeter of the rectangle respectively. Its constructor having parameters for length and breadth is used to initialize length and breadth of the rectangle. Let class 'Square' inherit the 'Rectangle' class with its constructor having a parameter for its side (suppose s) calling the constructor of its parent class as 'super(s,s)'. Print the area and perimeter of a rectangle and a square.

16. Create a class named 'Shape' with a method to print "This is This is shape". Then create two other classes named 'Rectangle', 'Circle' inheriting the Shape class, both having a method to print "This is rectangular shape" and "This is circular shape" respectively. Create a subclass 'Square' of 'Rectangle' having a method to print "Square is a rectangle". Now call the method of 'Shape' and 'Rectangle' class by the object of 'Square' class.

17. Suppose you have a Piggie Bank with an initial amount of $50 and you have to add some more amount to it. Create a class 'AddAmount' with a data member named 'amount' with an initial value of $50. Now make two constructors of this class as follows:
1 - without any parameter - no amount will be added to the Piggie Bank
2 - having a parameter which is the amount that will be added to Piggie Bank
Create object of the 'AddAmount' class and display the final amount in Piggie Bank.

18. Create an abstract class 'Parent' with a method 'message'. It has two subclasses each having a method with the same name 'message' that prints "This is the first subclass" and "This is the second subclass" respectively. Call the methods 'message' by creating an object for each Subclass.

19. An abstract class has a constructor which prints "This is constructor of abstract class", an abstract method named 'a_method' and a non-abstract method which prints "This is a normal method of abstract class". A class 'SubClass' inherits the abstract class and has a method named 'a_method' which prints "This is an abstract method". Now create an object of 'SubClass' and call the abstract method and the non-abstract method. (Analyse the result)

20. Create a class to print an integer and a character with two methods having the same name but different sequence of the integer and the character parameters. For example, if the parameters of the first method are of the form (int n, char c), then that of the second method will be of the form (char c, int n).

21. Suppose a class 'A' has a static method to print "Parent". Its subclass 'B' also has a static method with the same name to print "Child". Now call this method by the objects of the two classes. Also, call this method by an object of the parent class referring to the child class i.e. A obj = new B()

22. Factorial of any number n is represented by n! and is equal to 1*2*3*....*(n-1)*n. E.g.-
4! = 1*2*3*4 = 24
3! = 3*2*1 = 6
2! = 2*1 = 2
Also,
1! = 1
0! = 0
Write a program to calculate the factorial of a number.

23. Write a program using HashMap and perform the following

- Associate the specified value (numbers) with the specified key (colors)
- Count the number of key-value (size) mappings in the map.
- Copy all of the mappings from the present map to another map
- Remove all of the mappings from the map
- Check whether the map contains key-value mappings (empty) or not.

24. Write a program using an ArrayList and perform the following

- Create a new array list, add some animal names (string) as elements, and print out the collection.
- Insert an element (animal) into the array list at the first position.
- Retrieve an element (at a specified index) from the array list.
- Update specific array element by a given element.
- Remove the third element from the list.
- Search an element in the list.
- Iterate through all elements in the array list. (demonstrate this, using loop, and creating an Iterator and ListIterator)

****** END ******