4. Programming with classes

To strengthen your skills on this topic, solve the following tasks.

CLASSES AND OBJECT

1. Create class Test1 with two variables.
1) Add a display method and methods for modifying these variables.
2) Add a method that finds the sum of the values of these variables,
3) and a method that finds the largest value of these two variables.

2. Create class Test2 with two variables.
1) Add a constructor with input parameters.
2) Add a constructor that initializes the default class members.
3) Add set- and get- methods for the fields of the class instance.

3. Create a class of Student, that contains the following fields: first and last name, group number, marks (an array of five elements).
Create an array of 10 elements of this type. Add the option to display the names and numbers of groups of students with marks of only 9 or 10.

4. Create a Train class containing the following fields:
- the name of the destination,
- train number,
- departure time.
Create an array of five elements of the Train type, add the ability to sort the array elements by train numbers.
Add the ability to display information about the train by the entered number of the train.
Add the ability to sort the array by destination,
where trains with the same destination must be sorted by departure time.

5. Write a decade counter class that can increment or decrement its value by one within a specified range. Initialize the counter with default values and random values. The counter has methods for increasing and decreasing current, and a method for getting its current.

6. Write a class time. Provide the possibility of setting the time and changing its individual fields (hour, minute, second) while checking the validity of the entered values. In case of invalid field values, the field is set to 0. Create methods for changing the time by the specified number of hours, minutes and seconds.

7. Describe the class of the triangle. Provide methods for creating objects, calculating the area, perimeter and intersection of the medians.

8. Create a class of a Customer. Define constructors, set and get methods, and the toString () method.
Create a second class that aggregates an array of Customers, with appropriate constructors and methods.
Set the criteria for selecting data and display this data on the console.
- Customer class: id, last name, first name, patronymic, address, credit card number, bank account number.
- Also find the followings:
a) a list of Customers in alphabetical order;
b) a list of Customers in a given card number range.

9. Create a class of a Book. Define constructors, set and get methods, and the toString () method.
Create a second class that aggregates an array of type Book with appropriate constructors and methods.
Set the criteria for selecting data and display this data on the console.
Book: id, title, author (s), publisher, year of publication, number of pages, price, type of cover.
Find:
a) a list of books by a given author;
b) a list of books issued by a given publisher;
c) a list of books released after a given year.

10. Create an Airline class. Define Constructors, Set- and Get- Methods and the toString () method.
Create a second class that aggregates the Airline array with appropriate constructors and methods.
Set the criteria for selecting data and display this data on the console.
Airline: destination, flight number, aircraft type, departure time, days of the week.
Find and withdraw:
a) a list of flights for a given destination;
b) a list of flights for a given day of the week;
c) a list of flights for a given day of the week, the departure time for which is greater than the given one.

AGGREGATION AND COMPOSITION

1. Create an object of the Text class using the Sentence, Word classes.
Methods: add text, display text to console, text title.

2. Create an object of the Car class using the Wheel and Engine classes.
Methods: driving, refueling, changing a wheel, displaying the branf of the car on the console.

3. Create an object of the State (Country) class using the classes Region (State), District (no such in Germany), City.
Methods: display the capital, number of regions, area, regional centers on the console

4. Bank accounts. A customer has several bank accounts. Implement the possibility of blocking / unblocking an account.
Implement search and sorting of accounts. Calculation of the total amount on accounts.
Calculation of the amount for all accounts with positive and negative balances separately.

5. Tourist vouchers. Create a pool of a tourist voucher of various types (excursions, shopping, cruise, etc.).
Consider the choice of transport, food and the number of days. Implement the selection and sorting of tours.