Guide SWD homework

1. What is encapsulation?

Encapsulation is one of the fundamental principles of Object-Oriented Programming (OOP). It refers to bundling data (attributes) and methods (functions) that operate on the data into a single unit, known as a class.

Encapsulation restricts direct access to some of an object's components, which can prevent the accidental modification of data.

It is typically achieved by making some attributes private or protected and providing public methods to access and modify them.

2. Why would you use inheritance in an application?

Inheritance allows a class (child class) to inherit attributes and methods from another class (parent class).

This promotes code reuse, as common functionality can be written once in the parent class and reused by multiple child classes.

It also helps in creating a hierarchical relationship between classes, which can make the code more organized and easier to manage.

3. Explain the difference between inheritance and polymorphism?

Inheritance is the mechanism by which one class can inherit the attributes and methods of another class. It establishes a parent-child relationship between classes.

Polymorphism is the ability of different classes to be treated as instances of the same class through inheritance. It allows methods to be used interchangeably on objects of different classes, enabling a single function to handle objects of different types.

4. Why is the constructor important?

The constructor is a special method that is automatically called when an object of a class is instantiated.

It is used to initialize the attributes of the object. Constructors allow setting up any initial state or mandatory properties the object needs when created.

5. What are arrays used for?

Arrays are used to store multiple values in a single variable. They are a collection of items, all of which are of the same type, and are stored at contiguous memory locations.

Arrays allow for efficient indexing, access, and manipulation of a collection of data.

6. Name an application that uses arrays

Arrays are used in numerous applications, one of which is image processing. In image processing, images are often represented as arrays of pixels.

Each pixel can hold color values, and arrays are used to store and manipulate these values.

7. What is OOP?

OOP stands for Object-Oriented Programming. It is a programming paradigm that uses "objects" to design software.

Objects are instances of classes and can hold data (attributes) and code (methods). OOP principles include encapsulation, inheritance, polymorphism, and abstraction.

OOP aims to model real-world entities and relationships in software.

8. Why is OOP a preferred coding method?

OOP is preferred for several reasons:

Modularity: Code is organized into self-contained objects, making it easier to manage and maintain.

Reusability: Objects and classes can be reused across different parts of a program or in different programs.

Scalability: OOP allows for the creation of scalable software architectures by promoting code reuse and separation of concerns.

Maintainability: Encapsulation and abstraction help protect the internal state of objects, reducing the risk of unintended side effects and making the code easier to understand and maintain.

Flexibility: Polymorphism and inheritance allow for flexible and dynamic behavior, enabling objects to interact in versatile ways.