1 Research on how constructors help in software development. Explain how constructors contribute to object initialization, code reliability, and maintainability in object-oriented programming. Provide at least three examples of the real-world use cases where constructors are essential in solving practical software problems . Also mention the resources used for research.

The special method which is automatically called when objects are created is called constructor. The main purpose of it is to initialize the objects attributes to valid default or user provided values. (oracle, 2024)

How construction contributes are:

1. Object Initialization: The constructor is for ensuring that an object starts in a consistent, ready to use state by setting initial value for instance variables. If the proper initialization is not done the objects might contain garbage values.
2. Code Reliability: By enforcing the required parameters, the code reliability prevent the creation of invalid objects. They also include validation logic as well.
3. Maintainability: The initialization logic in constructors makes code easier to modify. If the initialization rules changes, we only have to update the constructor which helps to maintain the code more easily.

Three Real World examples are:

1. Banking/ Financial System
2. Database Connection Objects
3. Game development

2 Research on any one of the OOP principles (Encapsulation, Inheritance, Abstraction or Polymorphism). Also explain about Classes and objects as well. Give at least two examples how you can use the OOP principles.

The bundling of data and methods which operate on data within single class while restricting direct access to some of the object components by making fields private and providing public getters and setters is called encapsulation. (Thorben, 2023)

Class:

The class is the blueprint or the design which defines what an object will look like and what it can do. It contains attributes and behaviours.

Objects:

The object is actual instance which is created from the class. The object can be created as many objects as wanted from one class.

The two practical examples of using Encapsulation are:

1. Student grade management system
2. E-commerce shopping cart

3 References

oracle. (2024) */tutorial/java/javaOO/constructors.html* [Online]. Available from: https://docs.oracle.com/javase/tutorial/java/javaOO/constructors.html [Accessed 20 November 2025].

Thorben. (2023) */oop-concept-for-beginners-what-is-encapsulation/* [Online]. Available from: https://stackify.com/oop-concept-for-beginners-what-is-encapsulation/ [Accessed 20 November 2025].