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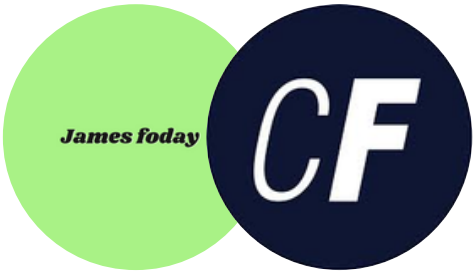

REFLECTION QUESTION

Learning Journal - Exercise 1.5 Reflection Questions

1. In your own words, what is object-oriented programming? What are the benefits of OOP?

Object-oriented programming (OOP) is a programming paradigm based on the concept of “objects”, which are instances of classes. Objects can contain both data (attributes) and functions (methods) that operate on that data. OOP helps organize code into modular, reusable components that model real-world entities more naturally.

The benefits of OOP include:

- **Encapsulation:** Bundling data and methods together to hide internal details and expose only necessary parts, which increases code security and clarity.
- **Reusability:** Classes and objects can be reused across programs, reducing duplication and speeding up development.
- **Inheritance:** New classes can inherit properties and behaviors from existing classes, allowing for easy extension and maintenance.
- **Polymorphism:** Objects of different classes can be treated through the same interface, enabling flexibility and integration.
- **Improved maintainability:** OOP makes complex programs easier to understand and modify by organizing code logically.

2. What are objects and classes in Python? Come up with a real-world example to illustrate how objects and classes work.

In Python, a **class** is a blueprint or template for creating objects. It defines attributes (data) and methods (functions) that characterize the objects. An **object** is an instance of a class, containing actual values for the attributes and able to invoke the methods defined by its class.

Real-world example:
Consider a class called Car. This class might have attributes like color, make, and model, and methods like start_engine() and stop_engine(). Each individual car you own or see on the road is an object (instance) of the Car class. For example, a red Toyota Corolla is one object, and a blue Ford Mustang is another. They share the same structure (class) but have different attribute values.

3. In your own words, write brief explanations of the following OOP concepts: Inheritance, Polymorphism, Operator Overloading.

Method	Description
Inheritance	Inheritance allows a new class (called a subclass or child class) to acquire properties and methods from an existing class (called the superclass or parent class). This promotes code reuse and allows specialized behavior by extending or overriding the base class. For example, a Truck class can inherit from a general Vehicle class but add features unique to trucks.
Polymorphism	Polymorphism means “many forms”. It allows objects of different classes to be treated through the same interface, typically by implementing methods with the same name but different behaviors. This enables writing flexible and extensible code. For instance, both Cat and Dog classes might have a speak() method that behaves differently, but can be called in the same way on any animal object.
Operator Overloading	Operator overloading allows developers to define custom behavior for built-in operators (like +, -, *, etc.) when applied to objects of user-defined classes. This lets objects interact using natural syntax. For example, a Vector class might overload the + operator to perform vector addition instead of concatenation or numeric addition.