**Exercise 2: E-commerce Platform Search Function**

Code:

**public class Product {**

**int productId;**

**String productName;**

**String category;**

**public Product(int productId, String productName, String category) {**

**this.productId = productId;**

**this.productName = productName;**

**this.category = category;**

**}**

**public String toString() {**

**return "ID: " + productId + ", Name: " + productName + ", Category: " + category;**

**}**

**}**

**Searchalg:**

**public class SearchAlgorithms {**

**public static Product linearSearch(Product[] products, int id) {**

**for (Product product : products) {**

**if (product.productId == id) {**

**return product;**

**}**

**}**

**return null;**

**}**

**public static Product binarySearch(Product[] products, int id) {**

**int low = 0;**

**int high = products.length - 1;**

**while (low <= high) {**

**int mid = (low + high) / 2;**

**if (products[mid].productId == id) {**

**return products[mid];**

**} else if (products[mid].productId < id) {**

**low = mid + 1;**

**} else {**

**high = mid - 1;**

**}**

**}**

**return null;**

**}**

**}**

**Main:**

**import java.util.Arrays;**

**public class Main {**

**public static void main(String[] args) {**

**Product[] products = {**

**new Product(102, "Laptop", "Electronics"),**

**new Product(101, "Shirt", "Clothing"),**

**new Product(103, "Phone", "Electronics")**

**};**

**System.out.println("=== Linear Search ===");**

**Product result1 = SearchAlgorithms.linearSearch(products, 103);**

**if (result1 != null) {**

**System.out.println("Product Found: " + result1);**

**} else {**

**System.out.println("Product not found.");**

**}**

**Arrays.sort(products, (a, b) -> a.productId - b.productId);**

**)**

**System.out.println("\n=== Binary Search ===");**

**Product result2 = SearchAlgorithms.binarySearch(products, 103);**

**if (result2 != null) {**

**System.out.println("Product Found: " + result2);**

**} else {**

**System.out.println("Product not found.");**

**}**

**}**

**}**

**A screenshot of a computer program

AI-generated content may be incorrect.**

**Exercise 7: Financial Forecasting**

**Code:**

**public class Forecast {**

**public static double predictFutureValue(double initialValue, double growthRate, int years) {**

**if (years == 0) {**

**return initialValue;**

**}**

**return predictFutureValue(initialValue \* (1 + growthRate), growthRate, years - 1);**

**}**

**}**

**Main:**

**public class Main {**

**public static void main(String[] args) {**

**double initialValue = 10000;**

**double annualGrowthRate = 0.10;**

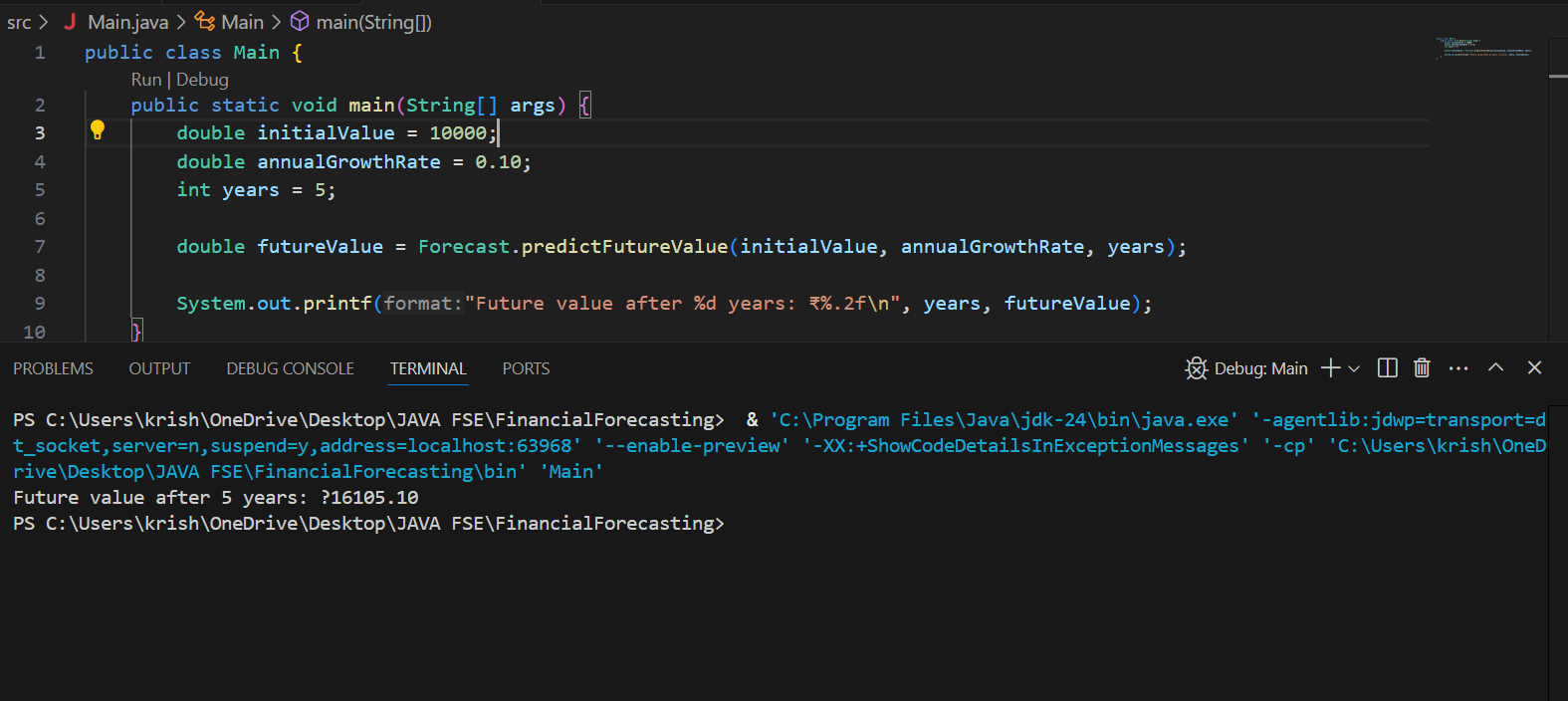
**int years = 5;**

**double futureValue = Forecast.predictFutureValue(initialValue, annualGrowthRate, years);**

**System.out.printf("Future value after %d years: ₹%.2f\n", years, futureValue);**

**}**

**}**

****