Exercise 1: Inventory Management System

Product.cs:

```
public class Product
{
    public int ProductId { get; set; }
    public string ProductName { get; set; }
    public int Quantity { get; set; }
    public double Price { get; set; }

    public Product(int id, string name, int quantity, double price)
    {
        ProductId = id;
        ProductName = name;
        Quantity = quantity;
        Price = price;
    }

    public override string ToString()
    {
        return $"ID: {ProductId}, Name: {ProductName}, Qty: {Quantity}, Price: {Price}";
    }
}
```

Inventory.cs

```
using System;
using System.Collections.Generic;
public class Inventory
{
    private Dictionary<int, Product> products = new Dictionary<int, Product>();
```

```
// Add Product
public void AddProduct(Product product)
{
    if (!products.ContainsKey(product.ProductId))
    {
        products[product.ProductId] = product;
        Console.WriteLine("Product added.");
    }
    else
    {
        Console.WriteLine("Product with this ID already exists.");
    }
}

// Update Product
public void UpdateProduct(int productId, int quantity, double price)
{
    if (products.ContainsKey(productId))
    {
        products[productId].Quantity = quantity;
        products[productId].Price = price;
        Console.WriteLine("Product updated.");
    }
    else
    {
        Console.WriteLine("Product not found.");
    }
}
```

```
    // Delete Product
    public void DeleteProduct(int productId)
    {
        if (products.Remove(productId))
            Console.WriteLine("Product removed.");
        else
            Console.WriteLine("Product not found.");
    }

    // Display All Products
    public void DisplayProducts()
    {
        foreach (var item in products.Values)
        {
            Console.WriteLine(item);
        }
    }
}
```

Program.cs

```
using System;
public class Program
{
    public static void Main(string[] args)
    {
        Inventory inventory = new Inventory();

        // Adding Products
        inventory.AddProduct(new Product(101, "Laptop", 5, 60000));
```

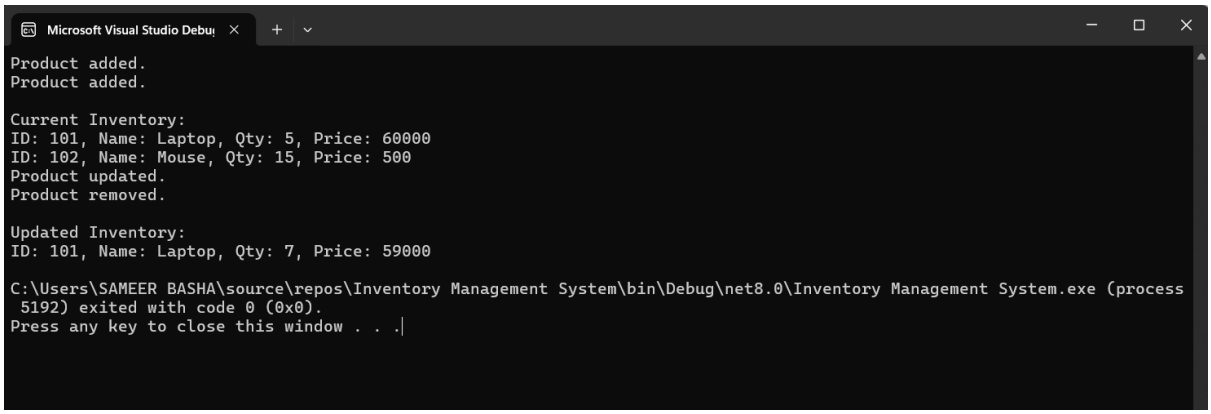
```
        inventory.AddProduct(new Product(102, "Mouse", 15, 500));

        // Display Products
        Console.WriteLine("\nCurrent Inventory:");
        inventory.DisplayProducts();

        // Update Product
        inventory.UpdateProduct(101, 7, 59000);

        // Delete Product
        inventory.DeleteProduct(102);

        Console.WriteLine("\nUpdated Inventory:");
        inventory.DisplayProducts();
    }
}
```



Exercise 2: E-commerce Platform Search Function

Product.cs:

```
public class Product
{
    public int ProductId { get; set; }
    public string ProductName { get; set; }
    public string Category { get; set; }

    public Product(int id, string name, string category)
    {
        ProductId = id;
        ProductName = name;
        Category = category;
    }

    public override string ToString()
    {
        return $"ID: {ProductId}, Name: {ProductName}, Category: {Category}";
    }
}
```

Program.cs:

```
using System;
public class Program
{
    public static void Main(string[] args)
    {
        Product[] products = {
            new Product(102, "Laptop", "Electronics"),
            new Product(101, "Shirt", "Clothing"),
```

```
        new Product(103, "Book", "Stationery")
    };

    // Linear Search (unsorted array)
    Console.WriteLine("Linear Search:");
    Product result1 = LinearSearch(products, 103);
    Console.WriteLine(result1 != null ? result1.ToString() : "Product not found");

    // Sort the array by ProductId for Binary Search
    Array.Sort(products, (p1, p2) => p1.ProductId.CompareTo(p2.ProductId));

    // Binary Search (sorted array)
    Console.WriteLine("\nBinary Search:");
    Product result2 = BinarySearch(products, 103);
    Console.WriteLine(result2 != null ? result2.ToString() : "Product not found");
}

public static Product LinearSearch(Product[] products, int targetId)
{
    foreach (Product product in products)
    {
        if (product.ProductId == targetId)
            return product;
    }
    return null;
}

public static Product BinarySearch(Product[] products, int targetId)
{
```

```
        int left = 0, right = products.Length - 1;

        while (left <= right)
        {
            int mid = (left + right) / 2;

            if (products[mid].ProductId == targetId)
                return products[mid];
            else if (products[mid].ProductId < targetId)
                left = mid + 1;
            else
                right = mid - 1;
        }
        return null;
    }
}
```