Exercise 1: Car Manufacturing Software

You are an engineer at a car manufacturing company. Your task is to develop software that can handle the creation of different types of cars (Sedan, SUV, Hatchback) with various customizations (color, engine type, accessories).

Hints

Think about a way to create objects where the creation logic is abstracted from the client.
Consider a pattern that allows for adding customizations to cars without modifying the base car classes.

Exercise 2: Smart Home System Integration

You are a software engineer tasked with integrating a smart home system with various third-party devices like smart lights, smart thermostats, and smart locks. Each device comes from a different manufacturer and has its own unique interface for control. Your job is to design a unified control interface for the smart home system that can communicate with these varied devices.

Hints

Think about creating a common interface that your smart home system expects for all devices. Consider the scenario where adding a new type of device to the system should not require changes to the existing system code.

Exercise 3: Modular House Construction

Your construction company builds modular homes. Each house can be customized with different modules (like additional rooms, balconies, gardens). Customers can choose which modules to include.

Hints

Consider how you would construct complex objects step by step, allowing for customization at each step.
Think about a design where the individual modules and the final house can be treated uniformly.

Exercise 4: Customizable Car Dashboard

You are developing a customizable dashboard system for cars, where features like GPS, music player, and climate control can be added or removed based on user preference.

Hints

Focus on a way to dynamically attach additional responsibilities to the dashboard without altering its structure.
The solution should allow for easy addition of new features.

Exercise 5: Factory Management Software

You're designing software for managing a factory that produces different types of products. The production process for each product type varies significantly.

Hints

Implement a solution that can create objects representing different production processes, hiding the instantiation logic from the client.
Consider a pattern that would allow the factory to expand its product line in the future without modifying its core management software.

Exercise 6: Fleet Management System

A company needs a system to manage its fleet of vehicles, which includes various types of vehicles like trucks, buses, and cars, each with different attributes and maintenance needs.

Hints

Look for a design pattern that allows treating individual vehicles and groups of vehicles uniformly.
The solution should handle the diverse types of vehicles efficiently, leveraging shared characteristics.