**Assignment 2**

**1. Vehicle Class Hierarchy**

python

class Vehicle:

def describe(self):

return "This is a vehicle."

class Car(Vehicle):

def describe(self):

return "This is a car."

class Bike(Vehicle):

def describe(self):

return "This is a bike."

# Example usage

vehicles = [Car(), Bike()]

for vehicle in vehicles:

print(vehicle.describe())

**2. Polymorphism for Shapes**

python

class Shape:

def area(self):

pass

class Circle(Shape):

def \_\_init\_\_(self, radius):

self.radius = radius

def area(self):

return 3.14 \* self.radius \* self.radius

class Rectangle(Shape):

def \_\_init\_\_(self, width, height):

self.width = width

self.height = height

def area(self):

return self.width \* self.height

# Calculate total area

def total\_area(shapes):

return sum(shape.area() for shape in shapes)

shapes = [Circle(5), Rectangle(4, 6)]

print("Total area:", total\_area(shapes))

**3. Using super() in Constructor**

python

class Shape:

def \_\_init\_\_(self):

print("Shape constructor called.")

class Rectangle(Shape):

def \_\_init\_\_(self, width, height):

super().\_\_init\_\_()

self.width = width

self.height = height

def calculate\_area(self):

return self.width \* self.height

# Example usage

rect = Rectangle(4, 5)

print("Area:", rect.calculate\_area())

**4. Polymorphic Function with Dog and Cat**

python

class Dog:

def make\_sound(self):

return "Woof!"

class Cat:

def make\_sound(self):

return "Meow!"

def process\_sound(sound\_object):

print(sound\_object.make\_sound())

# Example usage

process\_sound(Dog())

process\_sound(Cat())

**5. Abstract Base Class for File Handlers**

python

from abc import ABC, abstractmethod

class FileHandler(ABC):

@abstractmethod

def read(self):

pass

@abstractmethod

def write(self):

pass

class TextFileHandler(FileHandler):

def read(self):

print("Reading from a text file.")

def write(self):

print("Writing to a text file.")

class BinaryFileHandler(FileHandler):

def read(self):

print("Reading from a binary file.")

def write(self):

print("Writing to a binary file.")

# Example usage

text\_handler = TextFileHandler()

text\_handler.read()

text\_handler.write()

binary\_handler = BinaryFileHandler()

binary\_handler.read()

binary\_handler.write()