//Assignment 8

Title: Maximize Profit by Shipping Partial Orders (Fractional Knapsack) Problem Statement: You run a shipping company and need to load a truck with parcels of different weights and profits. The truck has a limited weight capacity. Write a program to choose parcels (even partially) to maximize profit using the Fractional Knapsack strategy.

```
def fractional_knapsack(weights, profits, capacity):
    ratio = [(profits[i] / weights[i], weights[i], profits[i]) for i in range(len(weights))]
    ratio.sort(reverse=True, key=lambda x: x[0])
    total_profit = 0
    selected_items = []
    for r, w, p in ratio:
        if capacity <= 0:
            break
        if w <= capacity:
            capacity -= w
            total_profit += p
            selected_items.append((w, p, 1.0))
        else:
            fraction = capacity / w
            total_profit += p * fraction
            selected_items.append((w, p, fraction))
            capacity = 0
    return total_profit, selected_items
```

```
def input_data():
    n = int(input("Enter number of parcels: "))
    weights = []
    profits = []
    for i in range(n):
        w = float(input(f"Enter weight of parcel {i+1}: "))
        p = float(input(f"Enter profit of parcel {i+1}: "))
        weights.append(w)
        profits.append(p)
    capacity = float(input("Enter truck capacity: "))
    return weights, profits, capacity
def display_result(selected, max_profit):
    print("\nSelected parcels:")
    for w, p, frac in selected:
        print(f"Weight: {w}, Profit: {p}, Taken: {frac*100:.2f}%")
    print(f"\nMaximum Profit: {max_profit:.2f}\n")

# Main menu loop
while True:
    print("\n=== Fractional Knapsack Menu ===")
    print("1. Enter Data and Calculate")
    print("2. Exit")
    choice = input("Enter choice: ")
    if choice == "1":
        weights, profits, capacity = input_data()
```

```
    max_profit, selected = fractional_knapsack(weights, profits, capacity)
    display_result(selected, max_profit)
elif choice == "2":
    print("Exiting... Goodbye!")
    break
else:
    print("Invalid choice. Try again.")
```

//OUTPUT

1. Enter Data and Calculate

2. Exit

Enter choice: 1

Enter number of parcels: 3

Enter weight of parcel 1: 10

Enter profit of parcel 1: 60

Enter weight of parcel 2: 20

Enter profit of parcel 2: 100

Enter weight of parcel 3: 30

Enter profit of parcel 3: 120

Enter truck capacity: 50

Selected parcels:

Weight: 10.0, Profit: 60.0, Taken: 100.00%

Weight: 20.0, Profit: 100.0, Taken: 100.00%

Weight: 30.0, Profit: 120.0, Taken: 66.67%

Maximum Profit: 240.00