**Assignment 3**

class Item:

def \_\_init\_\_(self, weight, value):

self.weight = weight

self.value = value

self.value\_per\_weight = value / weight

def knapsack\_fractional(items, capacity):

items.sort(key=lambda item: item.value\_per\_weight, reverse=True)

total\_value = 0

knapsack = []

for item in items:

if capacity == 0:

break

weight\_to\_take = min(item.weight, capacity)

total\_value += weight\_to\_take \* item.value\_per\_weight

capacity -= weight\_to\_take

knapsack.append((item, weight\_to\_take))

return total\_value, knapsack

def main():

n = int(input("Enter the number of items: "))

items = []

for i in range(n):

weight, value = map(int, input(f"Enter weight and value for item {i+1}: ").split())

items.append(Item(weight, value))

capacity = int(input("Enter the knapsack capacity: "))

total\_value, knapsack = knapsack\_fractional(items, capacity)

print("Knapsack items and their fractions:")

for item, fraction in knapsack:

print(f"Item with weight {item.weight}, value {item.value}: Fraction taken = {fraction}")

print("Total value in knapsack:", total\_value)

if \_\_name\_\_ == "\_\_main\_\_":

main()

**Output:**

Enter the number of items: 6

Enter weight and value for item 1: 10 80

Enter weight and value for item 2: 20 120

Enter weight and value for item 3: 30 100

Enter weight and value for item 4: 40 200

Enter weight and value for item 5: 50 150

Enter weight and value for item 6: 60 170

Enter the knapsack capacity: 150

Knapsack items and their fractions:

Item with weight 10, value 80: Fraction taken = 10

Item with weight 20, value 120: Fraction taken = 20

Item with weight 40, value 200: Fraction taken = 40

Item with weight 30, value 100: Fraction taken = 30

Item with weight 50, value 150: Fraction taken = 50

Total value in knapsack: 650.0