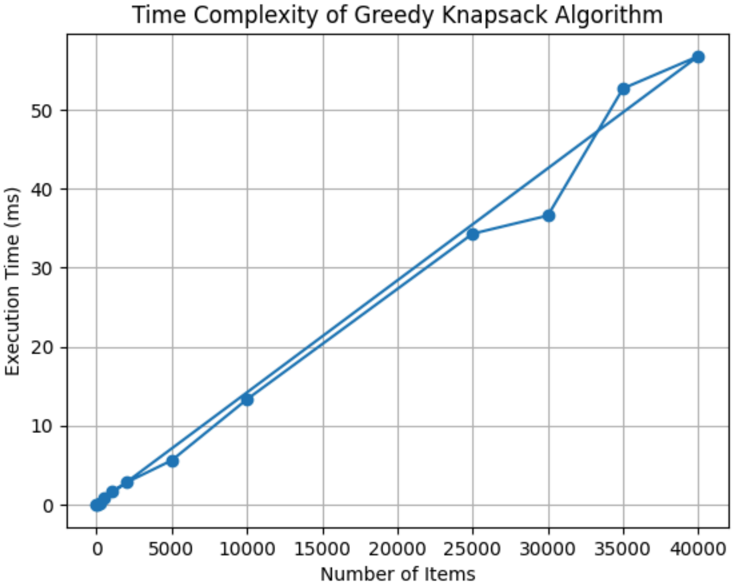
```
import random
import time
import matplotlib.pyplot as plt



def greedy_knapsack(n, m, W, P):
    items = [(P[i], W[i], P[i] / W[i]) for i in range(n)]
    items.sort(key=lambda x: x[2], reverse=True)

    total_profit = 0
    for i in range(n):
        if m > 0 and items[i][1] <= m:
            m -= items[i][1]
            total_profit += items[i][0]
        else:
            break

    if m > 0 and i < n:
        total_profit += items[i][0] * (m / items[i][1])

    return total_profit

def measure_time(n, m, trials=5):
    execution_times = []
    for _ in range(trials):
        start_time = time.time()

        W = [random.randint(1, 50) for _ in range(n)]
        P = [random.randint(10, 100) for _ in range(n)]
        ratios = [P[i] / W[i] for i in range(n)]

        result = greedy_knapsack(n, m, W, P)
        end_time = time.time()

        execution_times.append((end_time - start_time) * 1000)

    avg_time = sum(execution_times) / trials
    print(f"Execution time for {n} items: {avg_time:.3f} ms")
    return avg_time



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

num_items = [10, 250, 500, 1000, 2000, 5000, 10000, 25000,30000,35000,40000,min(n, 45000)]
execution_times = [measure_time(size, m) for size in num_items]
```

```
Execution time for 10 items: 0.000 ms
Execution time for 250 items: 0.200 ms
Execution time for 500 items: 0.800 ms
Execution time for 1000 items: 1.600 ms
Execution time for 2000 items: 2.800 ms
Execution time for 5000 items: 5.593 ms
Execution time for 10000 items: 13.322 ms
Execution time for 25000 items: 34.305 ms
Execution time for 30000 items: 36.605 ms
Execution time for 35000 items: 52.709 ms
Execution time for 40000 items: 56.790 ms
Execution time for 1 items: 0.000 ms
```

```
plt.plot(num_items, execution_times, marker='o', linestyle='-')
plt.xlabel("Number of Items")
plt.ylabel("Execution Time (ms)")
plt.title("Time Complexity of Greedy Knapsack Algorithm")
plt.grid()
plt.show()
```


Time Complexity of Greedy Knapsack Algorithm
Execution Time (ms)
0
10
20
30
40
50
Number of Items
0
5000
10000
15000
20000
25000
30000
35000
40000