

# Лабораторная работа №2. Задача о рюкзаке 0-1

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## Knapsack 01

- capacity: 165
  - optimal solution: [1, 1, 1, 1, 0, 1, 0, 0, 0, 0]
  - optimal weight: 165, and profit: 309
- BruteForce** optimal solution: [1, 1, 1, 1, 0, 1, 0, 0, 0, 0]

optimal weight: 165, and profit \*\*309\*\*

**Greedy** optimal solution: [1, 1, 1, 1, 0, 1, 0, 0, 0, 0]

optimal weight: 165, and profit \*\*309\*\*

**Branch-And-Bound** optimal solution: [1, 1, 1, 1, 0, 1, 0, 0, 0, 0]

optimal weight: 165, and profit \*\*309\*\*

**Dynamic** optimal solution: [1, 1, 1, 1, 0, 1, 0, 0, 0, 0]

optimal weight: 165, and profit \*\*309\*\*

**Genetic** optimal solution: [1, 1, 1, 1, 0, 1, 0, 0, 0, 0]

optimal weight: 165, and profit \*\*309\*\*

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## Knapsack 02

- capacity: 26
  - optimal solution: [0, 1, 1, 1, 0]
  - optimal weight: 26, and profit: 51
- BruteForce** optimal solution: [0, 1, 1, 1, 0]

optimal weight: 26, and profit \*\*51\*\*

**Greedy** optimal solution: [1, 0, 1, 0, 0]

optimal weight: 23, and profit \*\*47\*\*

**Branch-And-Bound** optimal solution: [0, 1, 1, 1, 0]

optimal weight: 26, and profit \*\*51\*\*

**Dynamic** optimal solution: [0, 1, 1, 1, 0]

optimal weight: 26, and profit \*\*51\*\*

**Genetic** optimal solution: [0, 1, 1, 1, 0]

optimal weight: 26, and profit \*\*51\*\*

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## Knapsack 03

- capacity: 190
- optimal solution: [1, 1, 0, 0, 1, 0]
- optimal weight: 190, and profit: 150

**BruteForce** optimal solution: [1, 1, 0, 0, 1, 0]

optimal weight: 190, and profit \*\*150\*\*

**Greedy** optimal solution: [1, 1, 0, 1, 0, 0]

optimal weight: 179, and profit \*\*146\*\*

**Branch-And-Bound** optimal solution: [1, 1, 0, 0, 1, 0]

optimal weight: 190, and profit \*\*150\*\*

**Dynamic** optimal solution: [1, 1, 0, 0, 1, 0]

optimal weight: 190, and profit \*\*150\*\*

**Genetic** optimal solution: [1, 0, 1, 0, 0, 1]

optimal weight: 153, and profit \*\*119\*\*

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## Knapsack 04

- capacity: 50
- optimal solution: [1, 0, 0, 1, 0, 0, 0]
- optimal weight: 50, and profit: 107

**BruteForce** optimal solution: [1, 0, 0, 1, 0, 0, 0]

optimal weight: 50, and profit \*\*107\*\*

**Greedy** optimal solution: [1, 1, 0, 0, 1, 1, 0]

optimal weight: 48, and profit \*\*102\*\*

**Branch-And-Bound** optimal solution: [1, 0, 0, 1, 0, 0, 0]

optimal weight: 50, and profit \*\*107\*\*

**Dynamic** optimal solution: [1, 0, 0, 1, 0, 0, 0]

optimal weight: 50, and profit \*\*107\*\*

**Genetic** optimal solution: [1, 1, 0, 0, 0, 1, 1]

optimal weight: 50, and profit \*\*105\*\*

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## Knapsack 05

- capacity: 104

- optimal solution: [1, 0, 1, 1, 1, 0, 1, 1]
  - optimal weight: 104, and profit: 900
  - **BruteForce** optimal solution: [1, 0, 1, 1, 1, 0, 1, 1]  
  
optimal weight: 104, and profit \*\*900\*\*
  - **Greedy** optimal solution: [1, 1, 0, 1, 1, 1, 1, 1]  
  
optimal weight: 97, and profit \*\*858\*\*
  - **Branch-And-Bound** optimal solution: [1, 0, 1, 1, 1, 0, 1, 1]  
  
optimal weight: 104, and profit \*\*900\*\*
  - **Dynamic** optimal solution: [1, 0, 1, 1, 1, 0, 1, 1]  
  
optimal weight: 104, and profit \*\*900\*\*
  - **Genetic** optimal solution: [1, 0, 1, 1, 1, 0, 1, 1]  
  
optimal weight: 104, and profit \*\*900\*\*
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## Knapsack 06

- capacity: 170
  - optimal solution: [0, 1, 0, 1, 0, 0, 1]
  - optimal weight: 169, and profit: 1735
  - **BruteForce** optimal solution: [0, 1, 0, 1, 0, 0, 1]  
  
optimal weight: 169, and profit \*\*1735\*\*
  - **Greedy** optimal solution: [1, 1, 1, 0, 0, 0, 0]  
  
optimal weight: 140, and profit \*\*1478\*\*
  - **Branch-And-Bound** optimal solution: [0, 1, 0, 1, 0, 0, 1]  
  
optimal weight: 169, and profit \*\*1735\*\*
  - **Dynamic** optimal solution: [0, 1, 0, 1, 0, 0, 1]  
  
optimal weight: 169, and profit \*\*1735\*\*
  - **Genetic** optimal solution: [0, 1, 0, 1, 0, 0, 1]  
  
optimal weight: 169, and profit \*\*1735\*\*
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## Knapsack 07

- capacity: 750
- optimal solution: [1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1]
- optimal weight: 749, and profit: 1458
- **BruteForce** optimal solution: [1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1]  
  
optimal weight: 749, and profit \*\*1458\*\*

**Greedy** optimal solution: [1, 1, 1, 0, 0, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1]

optimal weight: 740, and profit \*\*1441\*\*

**Branch-And-Bound** optimal solution: [1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1]

optimal weight: 749, and profit \*\*1458\*\*

**Dynamic** optimal solution: [1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1]

optimal weight: 749, and profit \*\*1458\*\*

**Genetic** optimal solution: [1, 0, 1, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 1]

optimal weight: 749, and profit \*\*1458\*\*

## Comparison:

benchmark	algorithm	execution mean	execution std	capacity	optim_weight	optim_profit
1	Branch-And-Bound	0	0	165	165	309
1	BruteForce	0.0016	0.0005	165	165	309
1	Dynamic	0.006	0.0007	165	165	309
1	Genetic	0.0145	0.0089	165	165	309
1	Greedy	0	0	165	165	309
2	Branch-And-Bound	0	0	26	26	51
2	BruteForce	0	0	26	26	51
2	Dynamic	0.0006	0.0005	26	26	51
2	Genetic	0.0004	0.0005	26	24	47
2	Greedy	0	0	26	23	47
3	Branch-And-Bound	0.0002	0.0005	190	190	150
3	BruteForce	0	0	190	190	150
3	Dynamic	0.0044	0.0006	190	190	150
3	Genetic	0.0004	0.0005	190	172	119
3	Greedy	0	0	190	179	146
4	Branch-And-Bound	0	0	50	50	107
4	BruteForce	0.0006	0.0005	50	50	107
4	Dynamic	0.0012	0.0004	50	50	107
4	Genetic	0.0014	0.0009	50	50	107
4	Greedy	0	0	50	48	102
5	Branch-And-Bound	0	0	104	104	900
5	BruteForce	0.0004	0.0005	104	104	900
5	Dynamic	0.0038	0.0008	104	104	900
5	Genetic	0.0032	0.0008	104	103	898

benchmark	algorithm	execution mean	execution std	capacity	optim_weight	optim_profit
5	Greedy	0	0	104	97	858
6	Branch-And-Bound	0.0002	0.0004	170	169	1735
6	BruteForce	0.0002	0.0005	170	169	1735
6	Dynamic	0.0052	0.0008	170	169	1735
6	Genetic	0.001	0.0007	170	169	1735
6	Greedy	0	0	170	140	1478
7	Branch-And-Bound	0.0042	0.0008	750	749	1458
7	BruteForce	0.0541	0.0147	750	749	1458
7	Dynamic	0.058	0.0047	750	749	1458
7	Genetic	0.306	0.0365	750	749	1458
7	Greedy	0.0002	0.0004	750	740	1441