

Integer Programming

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You need to choose 8 from problems 1-10.

1 Problem 1

You are going to assign n jobs to m workers. The time cost of the i -th worker doing the j -th job is C_{ij} and one worker can do one job at the same time. Please minimum all the time cost for all jobs.

2 Problem 2

You need n nutrient elements everyday and there are m kinds of optional food. The i -th food containing j -th nutrient element is W_{ij} and the price of i -th food is C_i . Minimize your daily expenses while maintaining your nutritional requirements.

3 Problem 3

There are n places can supply A and m markets need A. The output of the i -th place is a_i , the demand of the j -th market is b_j , and the cost of delivery from the i -th supply place to j -th market is C_{ij} . Minimize cost when guarantee the balance of supply and marketing.

4 Problem 4

Now you need to box up your dorm stuff. You have m items, n boxes, and there are enough boxes to fill them all. The occupy of the i -th items is C_i and the capacity of the j -th box S_j . Please pack all items into boxes with as few boxes as possible.

5 Problem 5

A machinery factory produces three kinds of products I, II and III, all of which have to go through two processes A and B. There are two equipment A_1 , A_2 can do A process and there are three equipment B_1 , B_2 and B_3 can do the B process. I can be processed on any specifications of equipment A and B. II can be processed on any specifications of equipment A, but for process B, it can only be processed on equipment B_1 . III can only be processed on equipment A_2 and B_2 . Please maximize profit for the plant.

6 Problem 6

The total amount of funds that a department can use for investment in the next five years is B million. There are n ($n > 3$) projects that can be invested. Assuming that each project can be invested at most once, The investment fund required for the j -th project is b_j million, and the profit obtained is c_j million. Ask how to choose an investment project to maximize the total profit?

7 Problem 7

A construction company has contracted to build two types of dormitories. Each dormitory of type A covers an area of s_i , and each dormitory of type B covers an area of s_j . The company has purchased a building land of s . According to the plan, the number of Type A dormitories shall not exceed n_i , and the number of Type B dormitories shall not exceed n_j . One dormitory of type A can earn c_i , and one dormitory of type B can earn c_j . How many type A and B dormitories should the company build?

8 Problem 8

A company plans to establish a sales department in the east, west and south districts of the city. Seven locations A_i ($i = 1, 2, \dots, 7$) are proposed. It is stipulated that in the east area, at most two of the three positions from A_1, A_2, A_3 should be selected; In the west area, at least one of the two positions from A_4, A_5 should be selected; In the south area, at least one of the two positions from A_6, A_7 should be selected. If the location A_i is selected, the equipment investment is estimated to be b_i yuan, and the annual profit is estimated to be c_i yuan, but the total investment cannot exceed B yuan. Which positions should be selected to maximize the annual profit?

9 Problem 9

A hiker needs to bring a backpack. The total weight of the backpack is limited to b kg. Now there are kinds of items to choose from. The j -th item is known to weigh a_j kg each and the use value is c_j , how should the traveler choose these items to maximize the total value?

10 Problem 10

There are people assigned to do jobs. It is stipulated that each person can only do one job, and each job can only be done by one person. It is known that the efficiency of the i -th person to do the j -th work is c_{ij} . How should we allocate to maximize overall efficiency?