

thms

1. You work as a freelancer and have a pool of 10 projects to work on. For each project you know how much money you will get for completing the project. You can complete any 3 projects this month. You want to select such projects that you will get the most money by completing them. What are the safe moves in this problem? (Mark all that apply.)

0 / 1 point

- ☐ Take the project which you like the most.
- ☐ Take the project for which you can apply the cool new technology that you've recently learned about.
- ☐ If there are more than 3 projects in the pool, remove the project with the lowest payment for completion, don't work on this project. In the other case, remove the first project from the pool and work on this project.
- ☒ Take the project with the highest payment for completion, complete it and remove it from the pool of projects.



Correct

Yes, this is a safe move. If you take the project with the highest payment for completion and then select two projects with the highest payoff from all the other projects in the pool, you will make the most money.

You didn't select all the correct answers

2. In the previous problem, what is the subproblem you need to solve after you've made a safe move?

1 / 1 point

- ☒ Choose projects with highest payment to work on from the pool of projects which now contains only 9 projects.

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2. In the previous problem, what is the subproblem you need to solve after you've made a safe move?

1 / 1 point

- ☒ Choose projects with highest payment to work on from the pool of projects which now contains only 9 projects.
- ☐ Determine the order in which to work on the selected projects.
- ☐ Compute the sum of payoffs you will get when you complete the selected projects.



Correct

You've either chosen the project with the largest payment for completion, completed it and removed it from the pool or selected the project with the lowest payment for completion and removed it from the pool. The pool contained 10 projects, and now it contains only 9.

3. You need to find an integer $23 \leq x \leq 73$ with the largest product of digits. You use a greedy strategy: first, determine the largest possible first digit (tens) of x , then determine the largest possible second digit (ones) of x (among all the numbers in the range from 23 to 73 whose first digit is equal to the digit selected at the first step). Will this greedy strategy work correctly?

1 / 1 point

- ☐ Yes.
- ☒ No.



Correct

This strategy will choose number 73, because 7 is the largest first digit for numbers between 23 and 73, and 3 is the largest second digit for numbers between 23 and 73 starting with digit 7. The product of digits of this number is 21. However, the product of digits of number 69 is 54, and 69 is between 23 and 73.

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apsack

Fractional Knapsack

TOTAL POINTS 3

1. You have a knapsack of capacity 10kg and three items. First item has weight 20kg and value 20, second item has weight 5kg and value 10. Third item has weight 4 kg and value 20. You want to maximize the total value of the fractions of items that fit into your knapsack. What is the safe move?

1 / 1 point

- ☐ Take the whole first item.
- ☐ Take 2kg of third item and 8 kg of first item.
- ☐ Take 10 kg of the first item.
- ☐ Take the whole second item.
- ☒ Take the whole third item.



Correct

Third item has value 5 per 1kg of weight, while first item has value 1 per 1 kg of weight and second item has value 2 per 1 kg of weight. So, safe move is to take the item with the largest value per 1 kg of weight - the third item. You can take the whole third item, because it fits into the knapsack.

2. What is the next safe move in the previous problem?

1 / 1 point

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Knapsack

2. What is the next safe move in the previous problem?

1 / 1 point

- ☐ Take the whole first item.
- ☐ Take the whole third item.
- ☐ Take 6 kg of the first item.
- ☐ Take 10 kg of the first item.
- ☒ Take the whole second item.



Correct

The third item is already in the knapsack. The second item has value 2 per 1 kg of weight, and the first item has value 1 per 1 kg of weight, so it is safe to take the second item, because it has higher value per 1 kg of weight. The knapsack capacity is 10 kg, you've already put 4 kg of the third item in the knapsack, and the second item is only 5 kg, so the whole second item still fits in the knapsack.

3. What is the last move?

1 / 1 point

- ☐ Take the whole second item.
- ☐ Take the whole third item.
- ☐ Take 1 kg of the second item.
- ☒ Take 1 kg of the first item.
- ☐ Take 10 kg of the first item.

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