

**Exercise 1a)**

**[3 points]**

From the search algorithms you had until this exercise sheet is due to, which ones are (trivially) parallelizable, and which ones either require more thoughts, or are impossible to parallelize? Write a sentence each. For each trivially parallelizable algorithm, give the pseudo code.

**Exercise 1b)**

**[4 points]**

Categorize the following problems according to the properties of a task environment (cf. Slide number 14 from the set of 2011-11-02):

- 1) VLSI layout problem
- 2) chess without a clock
- 3) ego-shooter game (e.g., counter strike)
- 4) Plant breeding of roses, maximizing their durability once cutted.

**Exercise 2a)**

**[3 points]**

What happens, if we apply a non-optimal algorithm to a problem?

What happens, if an algorithm is not complete?

Do situations exist in reality, in which one can apply an either non-optimal, or non-complete algorithm to some given problem? If so, give an example!

**Exercise 2b)**

**[6 points]**

Draw the search trees for the result sentence:

„AI is cool!“

(without parenthesis; assume that for each visited node, its label is outputted), if it was created by both the breadth-first, and depth-first search, with a maximal tree depth of 4.

How does the String look like, if the tree was processed by the other search algorithm?

**Exercise 2c)**

**[4 points]**

You are having three cans of different sizes: 12l, 8l, and 3l. Furthermore, you also have access to an infinite source of water. You may fill up each can to their maximum capacity at your wishes, be it either from the infinite water source, or from one of the other cans. You furthermore may at any time throw away all remaining water being contained in one can.

You aim at ending up with having one can, being filled with 1l of water.

Is there more than one solution?

Implement this simple sample using a programming language of your choice. Consider extensibility while implementing: You should be able to easily change the sizes of the can (e.g., changing the 12l can to one with 11 l), as well as the goal condition (e.g., trying to finally get 2l content).

*General Advice:*

Questions may be answered in either English or German. However, you are encouraged to answer in English, as mistakes do not affect your marking (exception: concatenation of random words do not gain you any points...). You will be asked to present your solutions, in English.

For each following tutorial, please always hand in a small solution sketch, making me able to follow your ideas.

Solutions should be handed in by e-mail to [busche@ismll.de](mailto:busche@ismll.de). Please note that this address differs from my moodle-email address! Please use an email header starting with [ai]. You will get a manually written „received“ message once I read your email