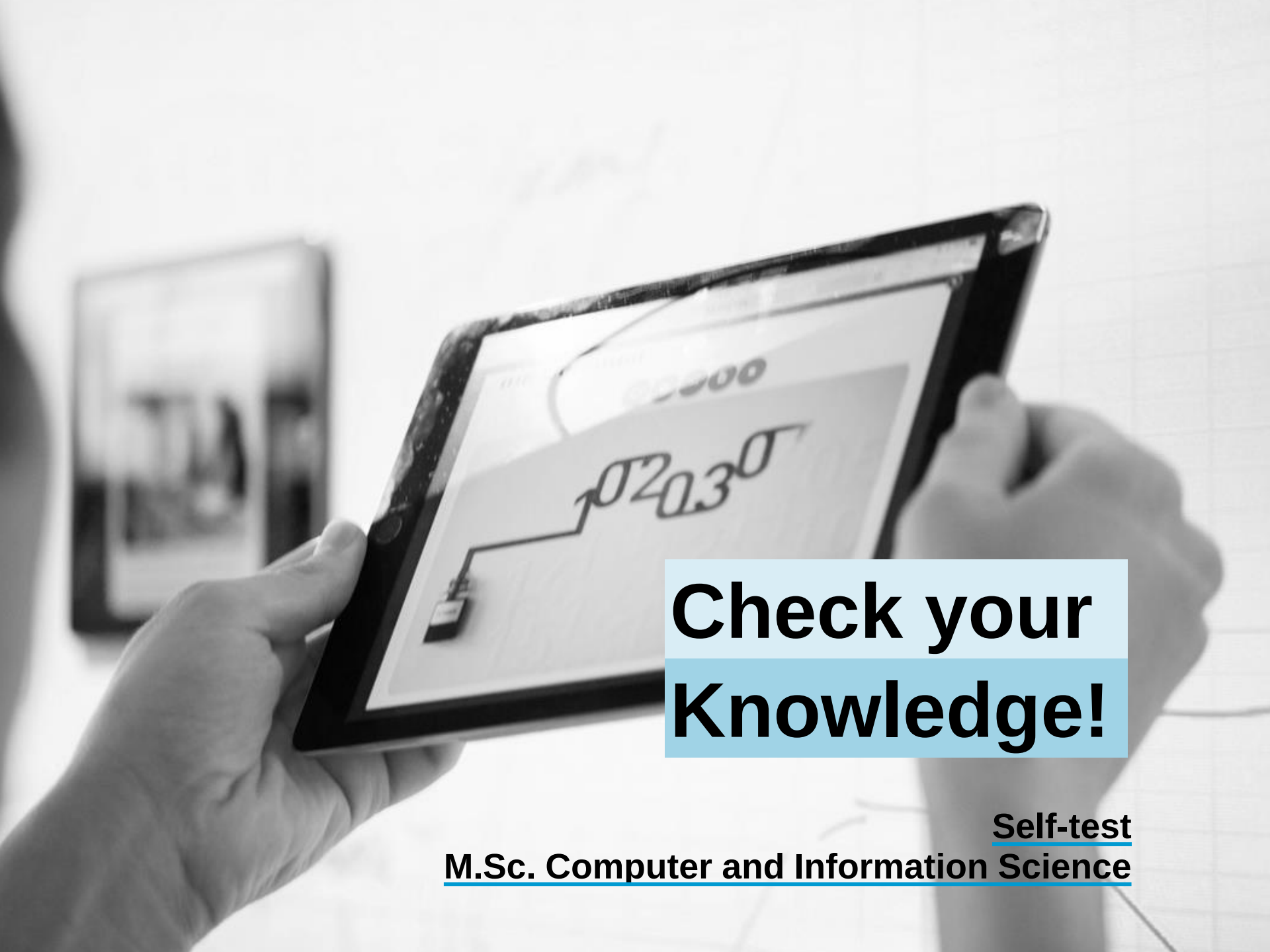


Check your Knowledge!

Self-test

M.Sc. Computer and Information Science

Interested in Computer and Information Science?

If you consider to apply for our Master's programme this self-test is an excellent opportunity to find out if your academic knowledge meets our requirements.

The following questions highlight the topics taught in the fundamentals of the bachelor´s programme in Computer Science. Students are expected to be familiar with these key competencies to ensure a smooth transition from their bachelor´s degree to our master´s degree in Computer and Information Science.
For a full list of all topics taught in our bachelor´s program please refer to the homepage of the department of Computer and Information Science:
www.informatik.uni-konstanz.de/en

Please check if you are able to complete all seven of the following questions by clicking the right answer. There is always one correct answer. It will take you around 15 minutes to complete the test. Good luck!

Your Department of
Computer and Information Science

Next >

Question #1

Information Encoding and Storage

What is the hexadecimal representation of the binary number 1101010_2?

Choose your answer >

Please, choose your answer.

(A) A6

(B) B5

(C) 5B

(D) 5A

(E) 6A

< Get back to the question

Sorry, the answer A6 is not correct.

Hint

Try to convert the binary number in groups of four digits:
0110 = ?; 1010 = ?

In a second step combine these results.

< Get back to the options

Sorry, the answer B5 is not correct.

Hint

Try to convert the binary number in groups of four digits:
0110 = ?; 1010 = ?

In a second step combine these results.

< Get back to the options

Sorry, the answer 5B is not correct.

Hint

Try to convert the binary number in groups of four digits:
0110 = ?; 1010 = ?

In a second step combine these results.

< Get back to the options

Sorry, the answer 5A is not correct.

Hint

Try to convert the binary number in groups of four digits:
0110 = ?; 1010 = ?

In a second step combine these results.

< Get back to the options

(E) 6A

Yes, you are right!

This is the correct answer.

Explanation
Every digit of a hexadecimal number can be represented by 4 digits in a binary number. So the conversion can be made 4 digits at a time:

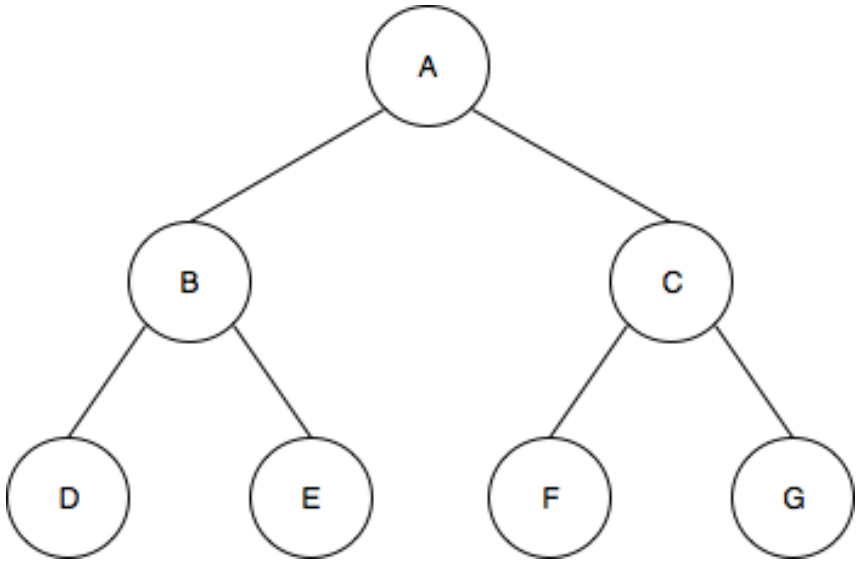
$1010_2 = 8 + 2 = 10 = A_{16}$
$0110_2 = 4 + 2 = \ \ 6 = 6_{16}$
$\rightarrow 110 \mid 1010_2 = 6A_{16}$

Next >

Question #2

Algorithms and Data Structures

What is the result of a postorder traversal in the following binary tree?



Choose your answer >

Please, choose your answer.

(A) ABCDEFG

(B) DBEAFCG

(C) DEBFGCA

(D) ABDECFG

(E) DEBACFG

< Get back to the question

Sorry, the answer ABCDEFG is not correct.

Hint

For postorder traversal visit childnodes from left to right before listing the root node itself.

< Get back to the options

Sorry, the answer DBEAFCG is not correct.

Hint

For postorder traversal visit childnodes from left to right before listing the root node itself.

< Get back to the options

(C) DEBFGCA

Yes, you are right!

This is the correct answer.

Explanation
For postorder traversal the child nodes get visited before the root node. First visit the left sub-tree of the node A. Here the nodes D and E get visited, the their parent B. Now the right sub-tree of node A is traversed the same way. The last node is the root node A.

Next >

Sorry, the answer ABDECFG is not correct.

Hint

For postorder traversal visit childnodes from left to right before listing the root node itself.

< Get back to the options

Sorry, the answer DEBACFG is not correct.

Hint

For postorder traversal visit childnodes from left to right before listing the root node itself.

< Get back to the options

Question #3

Algorithms and Data Structures

Which of the following sorting algorithms both have a worst case complexity of O(n*log(n))?

Choose your answer >

Please, choose your answer.

(A) Quicksort, Mergesort

(B) Mergesort, Insertion Sort

(C) Heapsort, Quicksort

(D) Heapsort, Mergesort

< Get back to the question

Sorry, the answer Quicksort, Mergesort is not correct.

Hint

Quicksort has a average complexity of O(n*log(n)), but a worst case complexity of $O(n^2)$.

< Get back to the options

Sorry, the answer Mergesort, Insertion Sort is not correct.

Hint

Insertion Sort has a complexity of $O(n^2)$.

< Get back to the options

Sorry, the answer Heapsort, Quicksort is not correct.

Hint

Quicksort has a average complexity of O(n*log(n)), but a worst case complexity of $O(n^2)$.

< Get back to the options

(D) Heapsort, Mergesort

Yes, you are right!

This is the correct answer.

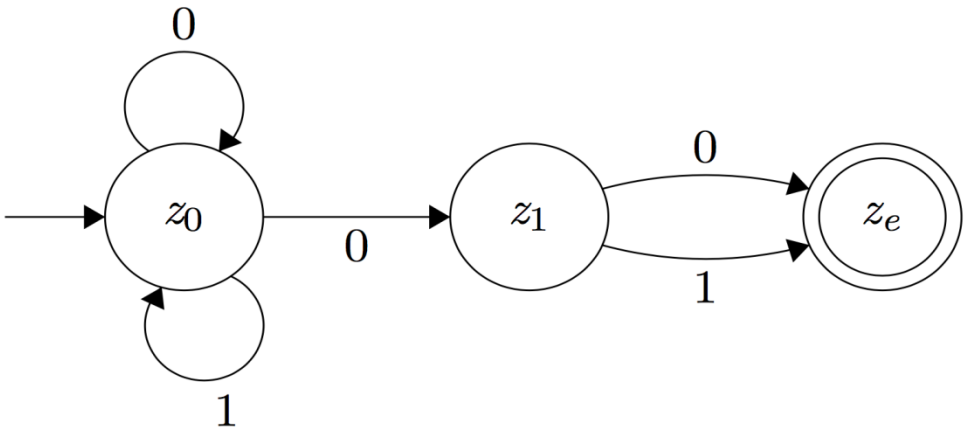
Explanation
The sorting algorithms Heapsort and Mergesort have a complexity of O(n*log(n)) in best, average and worst case.

Next >

Question #4

Algorithms and Data Structures

Which regular expression is equal to the following finite state machine?



Choose your answer >

Please, choose your answer.

(A) 0(0|1)*

(B) (0|1)*0(0|1)*

(C) (0|1)*0(0|1)

(D) (0|1)0(0|1)

< Get back to the question

Sorry, the answer $0(0|1)^*$ is not correct.

Hint

Start with the state z_0: How can you get to this state? Is repetition possible? Create a simple regular expression for this state and append the expression for the next states.

< Get back to the options

Sorry, the answer (0|1)*0(0|1)* is not correct.

Hint

Start with the state z_0: How can you get to this state? Is repetition possible? Create a simple regular expression for this state and append the expression for the next states.

< Get back to the options

(C) (0|1)*0(0|1)

Yes, you are right!

This is the correct answer.

Explanation
You can get to the state z_0 by any combination of 1s and 0s, also with an empty string because z_0 is the inital state. So the expression is: (0|1)*. With a 0 you can get from z_0 to z_1. From there you can go to z_e by either having 0 or 1. The full expression then is: (0|1)*0(0|1).

Next >

Sorry, the answer (0|1)0(0|1) is not correct.

Hint

Start with the state z_0: How can you get to this state? Is repetition possible? Create a simple regular expression for this state and append the expression for the next states.

< Get back to the options

Question #5

Programming Paradigms

Which values do x and i have at the end of the following function?

```
public void someFunction() {
        int x = 35;

        for(int i=10; i>0; i--) {
                x = x % I;
                if(x == 0)
                        break;
        }
}
```

Choose your answer >

Please, choose your answer.

(A) x=10, i=0

(B) x=5, i=0

(C) x=0, i=5

(D) x=0, i=10

(E) x=0, i=0

< Get back to the question

Sorry, the answer x=10, i=0 is not correct.

Hint

Try to go through the for-loop repetition for repetition and try to calculate the values for x and i at every instruction inside the loop. When and with which values does the loop exit?

< Get back to the options

Sorry, the answer x=5, i=0 is not correct.

Hint

Try to go through the for-loop repetition for repetition and try to calculate the values for x and i at every instruction inside the loop. When and with which values does the loop exit?

< Get back to the options

(C) x=0, i=5

Yes, you are right!

This is the correct answer.

Explanation
The for-loop has two exit conditions: i=0 and x=0. If one is met, the loop, and therefore the function, will exit. This is the case when x=5 and i=5. Then i=0 and x gets set to 0, so the loop will exit.

Next >

Sorry, the answer x=0, i=10 is not correct.

Hint

Try to go through the for-loop repetition for repetition and try to calculate the values for x and i at every instruction inside the loop. When and with which values does the loop exit?

< Get back to the options

Sorry, the answer x=0, i=0 is not correct.

Hint

Try to go through the for-loop repetition for repetition and try to calculate the values for x and i at every instruction inside the loop. When and with which values does the loop exit?

< Get back to the options

Question #6

Database Systems

In which form is a relation if it is in BCNF and has no multivalued dependencies?

Choose your answer >

Please, choose your answer.

(A) second normal form

(B) fourth normal form

(C) domain normal form

(D) third normal form

(E) key normal form

< Get back to the question

Sorry, the answer second normal form is not correct.

Hint

The higher the normal form, the stronger it is. BCNF is stronger then the third normal form.

< Get back to the options

(B) fourth normal form

Yes, you are right!

This is the correct answer.

Explanation
The fourth normal form is stronger than BCNF. In addition to the rules of BCNF, multivalued dependencies aren’t allowed.

Next >

Sorry, the answer domain normal form is not correct.

Hint

The higher the normal form, the stronger it is. BCNF is stronger then the third normal form.

< Get back to the options

Sorry, the answer third normal form is not correct.

Hint

The higher the normal form, the stronger it is. BCNF is stronger then the third normal form.

< Get back to the options

Sorry, the answer key normal form is not correct.

Hint

The higher the normal form, the stronger it is. BCNF is stronger then the third normal form.

< Get back to the options

Question #7

Logic and Combinatorics

Which of the following expressions is in the sum-of-products (SOP) form?

Choose your answer >

Please, choose your answer.

(A) AB + CD

(B) (A+B)(C+D)

(C) (A)B(CD)

(D) (A+B)(CD)

< Get back to the question

(A) AB + CD

Yes, you are right!

This is the correct answer.

Explanation
The term AB + CD is a sum of the products AB and CD, so it is in SOP form.

Next >

Sorry, the answer $(A+B)(C+D)$ is not correct.

Hint

In SOP form a term is a sum of multiple product terms.

< Get back to the options

Sorry, the answer (A)B(CD) is not correct.

Hint
In SOP form a term is a sum of multiple product terms.

< Get back to the options

Sorry, the answer $(A+B)(CD)$ is not correct.

Hint

In SOP form a term is a sum of multiple product terms.

< Get back to the options

Well done!

If you had problems to solve some of the questions – don‘t worry! There are plenty of opportunities to improve your skills.

Further Explanations
Find more explanations and deeper information around the subject matters on the following page.

Need Help? Contact us!
We are happy to give you personal advice and find out whether our programme is what you are looking for.

Next >

Further Explanations

- **Information encoding and storage**
  →Click here.

- **Algorithms and Data Structures**
  →Click here.
  →Click here.
  →Click here.

- **Programming Paradigms**
  →Click here.
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- **Database Systems**
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