FRAGE 1 von 180

offen_001 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 1_0**

Name and briefly describe three characteristics of computer algorithms.

Input (Zero or more input values.),

Output (One or more output values.),

Definiteness (Clear and unambiguous set of instructions.),

Termination (The algorithm terminates in a finite number of steps.),

Effectiveness(The instructions must be feasible.)

(1 point per characteristic, 1 point per description)

FRAGE 2 von 180

offen_005 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 1_0**

If f(n)≥0, and g(n)≥0, show that max(f(n),g(n)) = Θ(f(n)+g(n)).

max(f(n)+g(n)) ≤f(n)+g(n) => max(f(n),g(n)) = O(g(n). f(n) ≤ max(f(n),g(n)) , g(n) ≤ max(f(n),g(n) =>

1/2(f(n)+g(n))≤max(f(n)+g(n))≤f()+g(n) => max(f(n),g(n)) = Θ(f(n)+g(n).

Scoring: Relationship between max and sum shown correctly(1 point). Steps using big-Oh notation

shown correctly (3 points). Steps using big-Omega notation shown correctly(3 points). Final result using

big-Theta notation shown correctly (3 points).

FRAGE 3 von 180

offen_043 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 1_0**

Name three types of control structures.

Control structures used inside statements, such as those governed by rules of associativity and

operator precedence (2 points).

Control structures used with groups of statements, for example, those associated with conditional

statements and loops (2 points).

Control structures facilitating flow of control between program units (2 points).

FRAGE 4 von 180

offen_049 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 1_0**

Given a Python list of strings list a, give the Python statements required to print the following items from list a:
a. The lexicographically smallest string
b. The first character of the lexicographically largest string
c. The lexicographically smallest character of the lexicographically largest string

a. print(min(list a))(2 points)

b. print((max(list a)[0]))(3 points)

c. print(min(max(list a)))(3 points)

FRAGE 5 von 180

offen_050 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 1_0**

Name two advantages and two disadvantages of chains over singly linked lists.

Advantages of chains: In a chain, elements can be added easily in an intermediate position, before a

given node. In a singly linked list, this would require a traversal from the head of the list up to the node

previous to the one being inserted. (2 points).

In a singly linked list, deletion of a node requires pointers to the node being deleted and the node before

it. In the case of a chain, deletion is easier, since just a pointer to the node being deleted will suffice(2

points).

Disadvantages of chains: A chain requires more space since additional pointers need to be stored(2

points).

In a chain, additional pointers also need to be updated during operations(2 points).

FRAGE 6 von 180

offen_052 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 1_0**

Consider a binary tree T of height three. Provide a detailed calculation for each of the following tasks:
a. Compute the minimum number of leaves in T.
b. Compute the maximum number of leaves in the penultimate level of T.
c. Compute the minimum number of leaves in T if it is a full binary tree.
d. Compute the maximum number of leaves in the last level of T.

a. Below the root, each level can have one leaf node. So the minimum number of leaves is three(3 points).

b. In the penultimate level, there are four nodes, of which at most three can be leaves.(3 points).

c. Two. If the tree is full, every internal node must have two child nodes. Since the penultimate level has a minimum of one internal node, the same node can have two children as leaf nodes on the last level (3 points).

d. The maximum number of leaves on level three is 2X2X2 = 8(1 point).

FRAGE 7 von 180

MC_001 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 1_0**

In the von Neumann architecture, data may be stored in the RAM and the secondary memory. In which of these types of memory is the storage ephemeral in nature?

Wählen Sie eine Antwort:

- ☐ Both RAM and secondary storage
- ☐ Neither secondary storage nor RAM
- ☑ RAM but not secondary storage
- ☐ Secondary storage but not RAM

FRAGE 8 von 180

MC_003 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 1_0**

Which of the following factors could **not**influence the actual running time of an algorithm?

Wählen Sie eine Antwort:

- ☐ Data set used
- ☐ Library of basic algorithms
- ☑ Machine used
- ☐ Software environment

FRAGE 9 von 180

MC_004 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 1_0**

A good language is characterized by many attributes. Which one implies all possible ways to
combine a few primitive constructs?

Wählen Sie eine Antwort:

- ☐ Clarity
- ☐ Expressivity
- ☑ Orthogonality
- ☐ Portability

FRAGE 10 von 180

MC_005 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 1_0**

What is the result of max(3,"3") in Python?

Wählen Sie eine Antwort:

- ☐ "3"
- ☐ 3
- ☐ 6

☑ It results in a type error.

FRAGE 11 von 180

MC_006 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 1_0**

Consider the Python assignment a,b,c = 3**2**2, (3**2)**2,3**(2**2). Which statement is
correct about the values of a,b and c?

Wählen Sie eine Antwort:

☑ All are 81.
☐ Only a is 81.
☐ Only b is 81.
☐ Only c is 81.

FRAGE 12 von 180

MC_007 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 1_0**

Consider the following Python statement: 1 or False.
What is the result of executing the statement?

Wählen Sie eine Antwort:

☐ 0
☑ 1
☐ False
☐ True

FRAGE 13 von 180

MC_050 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 1_0**

What is the time complexity of an algorithm measured in terms of?

Wählen Sie eine Antwort:

☐ The time complexity is always measured in terms of the complexity of its output.

☑ The time complexity of an algorithm is always measured in terms of the input size.
☐ The time complexity of an algorithm is always measured in terms of the output size.
☐ The time complexity of an algorithm is measured in terms of the number of instructions it has.

FRAGE 14 von 180

MC_052 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 1_0**

Which method(s) of representing algorithms has/have the significant disadvantage that it does
not scale up well to complex problems?

Wählen Sie eine Antwort:

☐ Both natural language representation and pseudocode
☑ Flowcharts
☐ Natural language representation only
☐ Pseudocode only

FRAGE 15 von 180

MC_053 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 1_0**

Which of the following is a comparison operation in Python ?

Wählen Sie eine Antwort:

☐ a ++ b
☐ a += b
☐ a = b
☑ a == b

FRAGE 16 von 180

MC_056 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 1_0**

In a chain, consider a node v other than the first and the last. Which of the two pointers,
predecessor and successor, does node v have?

Wählen Sie eine Antwort:

- ☑ Both predecessor and successor
- ☐ Neither predecessor nor successor
- ☐ Predecessor only
- ☐ Successor only

FRAGE 17 von 180

MC_060 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 1_0**

If x is 3 and y is 2, what are the values of x and y if we execute x = y followed by y = x in
Python?

Wählen Sie eine Antwort:

- ☑ Both x and y are 2
- ☐ Both x and y are 3
- ☐ x is 2 and y is 3
- ☐ x is 3 and y is 2

FRAGE 18 von 180

MC_062 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 1_0**

What is a system called in which the least significant byte is stored at the highest address?

Wählen Sie eine Antwort:

- ☑ Big Endian

☐ Big byteorder
☐ Least significant last
☐ Little Endian

FRAGE 19 von 180

MC_065 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 1_0**

What does the following python code print?
a,b,c=2,3,4
a,b,c=c,a,b
if(a < b): c += 2
elif c == 3: c += 1
print ‘C‘

Wählen Sie eine Antwort:

☐ 2
☐ 3
☑ 4
☐ 5

FRAGE 20 von 180

MC_067 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 1_0**

Which of the following statements in Python evaluates to FALSE?
(A)1 << (2 == 3) (B) 1 << 2 == 3

Wählen Sie eine Antwort:

☐ A only
☑ B only
☐ Both A and B
☐ Neither A nor B

FRAGE 21 von 180

offen_007 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 2_0**

Suppose a Stack S is subjected to the following sequence of operations:
s.push("5")
s.push("22")
s.pop()
s.push("32")
s.push("25")
s.pop()
Indicate the contents of the stack after each operation.

s.push("5") Stack = 5 (1 point)

s.push("22") Stack = 5,22 (1 point)

s.pop() Stack = 5 (1 point)

s.push("32") Stack = 5,32 (1 point)

s.push("25") Stack = 5,32,25 (1 point)

s.pop() Stack = 5,32 (1 point)

FRAGE 22 von 180

offen_008 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 2_0**

You are given an unsorted list of integers. Explain how you can print the sequence in non increasing order using a Max Heap.

1. Insert all elements of the list into the Heap one by one(3 points).

2. Apply the ExtractMax() operation on the Heap and print the extracted element. Repeat this until the

heap is empty (3 points).

FRAGE 23 von 180

offen_010 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 2_0**

In Python, inheritance is indicated using the syntax class A(B), where A and B are classes.
a. State, among A and B, which is the base class and which is the derived class.
b. Briefly describe three types of possible relationships between methods of A and B.

a. B is the base class (1 point) and A is the derived class (1 point).

b. A inherits some methods of B(2 points), A extends B with some new methods(2 points) and A

overrides some methods of B(2 points).

FRAGE 24 von 180

offen_011 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 2_0**

Consider a Max-Heap of 9 elements.
a. How many elements are in the last level?
b. How many elements are there in the penultimate level?
c. How many leaf nodes are there in the heap?
d. How many consecutive insert operations will increase the height of the heap by one?
e. How many consecutive extractMax operations will reduce the height of the heap by two?

a. 2

b. 4

c. 5

d. 7

e. 6

(2 points per correct answer)

FRAGE 25 von 180

offen_059 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 2_0**

Consider a part of a Python class definition for a "Loan" class:
class Loan:
def __init__(self, customer=",rate,amount=5000,years=1):
Suppose the loan constructor is called with the customer name “John”, a rate of 2.2%, and the amount of $10,000.
a. What is the Python syntax for the call?
b. Name what is created in the memory as a result.
c. Describe the initializations that the __init__ method performs as a result.

a. The loan constructor is invoked as Loan ("John",2.2,10000) (3 points).

b. This creates a loan object in memory (1 point).

c. The __init__ method initializes name of customer as "John" (1 point), rate as 2.2% (1 point), amount as $10,000 (1 point) and years as 1 (1 point).

FRAGE 26 von 180

offen_064 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 2_0**

Consider the following Python code snippet and write the results of executing x.y where x is
one of {a,b,c} and y is one of {f(),g(),h()}.

```
class A:
def f(self): print("A")
def g(self): print("A")
class B(A):
def g(self): print("B")
class C(B):
def h(self):self.g(); print("C")
a=A();b=B();c=C()
```

a.f() prints A (1 point)

a.g() prints A (1 point)

b.f() prints A (1 point)

b.g() prints B (1 point)

c.f() prints A (1 point)

c.g() prints B (1 point)

c.h() prints B, C (2 point)

a.h() prints an AttributeError message (1 point)

b.h() prints an AttributeError message (1 point)

FRAGE 27 von 180

MC_008 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 2_0**

Which of the following data structures uses a FIFO paradigm?

Wählen Sie eine Antwort:

- ☐ Heap
- ☑ Queue
- ☐ Stack
- ☐ Trie

FRAGE 28 von 180

MC_010 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 2_0**

Which graph representation is most suitable for sparse graphs?

Wählen Sie eine Antwort:

- ☑ Adjacency list
- ☐ Adjacency matrix
- ☐ Edge list
- ☐ Incidence matrix

FRAGE 29 von 180

MC_011 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 2_0**

Let class A be a subclass of class B. Which of the following scenarios is possible?

Wählen Sie eine Antwort:

- ☑ A inherits methods from B.
- ☐ B extends A with some new methods
- ☐ B inherits methods from A.
- ☐ Some methods of A are overridden by B

FRAGE 30 von 180

MC_012 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 2_0**

Let class A be a subclass of class B. Consider the following statements.
P: Methods of A are subset of methods of B.
Q: Methods of B are a subset of methods of A.
Which of P and Q are true?

Wählen Sie eine Antwort:

- ☐ Both P and Q
- ☑ Neither P nor Q
- ☐ P but not Q
- ☐ Q but not P

FRAGE 31 von 180

MC_013 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 2_0**

Which of the following sequences stored is a valid sequence that can be obtained from a
level-order traversal of a Max-Heap? Assume that the level-order traversal visits nodes on the
same level, from left to right.

Wählen Sie eine Antwort:

- ☐ 12,7,9,5,1,13,8
- ☐ 12,7,9,5,1,8,13
- ☐ 12,9,7,5,1,8,13
- ☑ 13,7,12,5,1,9,8

FRAGE 32 von 180

MC_071 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 2_0**

Which of the following data structures has push and pop as operations?

Wählen Sie eine Antwort:

- ☐ Heap
- ☐ Queue
- ☑ Stack
- ☐ Tree

FRAGE 33 von 180

MC_072 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 2_0**

How much time would it take to retrieve the earliest inserted element from a stack?

Wählen Sie eine Antwort:

- ☐ O(1)
- ☐ O(log log n)
- ☐ O(log n)
- ☑ O(n)

FRAGE 34 von 180

MC_074 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 2_0**

Which of the following methods is/are followed by the Heap data structure?
Answer option 1: LIFO
Answer option 2: FIFO

Wählen Sie eine Antwort:

- ☐ Both answer 1 and 2 are correct.
- ☑ Neither answer 1 nor 2 is correct.
- ☐ Only answer 1 is correct.
- ☐ Only answer 2 is correct.

FRAGE 35 von 180

MC_076 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 2_0**

Which of the following data structures is a natural choice in Djikstra's shortest path algorithm
for the priority queue implementation?

Wählen Sie eine Antwort:

- ☐ Chain
- ☑ Heap
- ☐ Queue
- ☐ Stack

FRAGE 36 von 180

MC_080 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 2_0**

Consider a sorted sequence stored in an array. Which of the following statements is correct?

Wählen Sie eine Antwort:

- ☐ It represents a MAX Heap only.
- ☐ It represents a MIN Heap only.
- ☑ It represents either a MIN Heap or a MAX Heap.
- ☐ It represents neither a MAX Heap nor a MIN Heap.

FRAGE 37 von 180

MC_081 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 2_0**

For which of the following types does the len() function not work in Python?

Wählen Sie eine Antwort:

- ☑ Integer
- ☐ Lists
- ☐ Strings

☐ Tuples

FRAGE 38 von 180

MC_086 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 2_0**

An input item may be printed immediately, or may be stored in a stack and popped and
printed later on. Which of the following is a valid output sequence for the input sequence
1,2,3,4,5,6?

Wählen Sie eine Antwort:

☐ 1,6,2,3,4,5
☑ 3,4,2,6,5,1
☐ 3,4,5,6,1,2
☐ 6,5,4,3,1,2

FRAGE 39 von 180

MC_087 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 2_0**

Consider a binary tree in which the key value stored at any non-leaf node v is greater than or
equal to any key value stored in a non-empty child of v. Which of the following statements
about the binary tree is correct?

Wählen Sie eine Antwort:

☐ It is a MIN-Heap.
☐ It is not a MAX-Heap.
☑ It may be a MAX-Heap.
☐ It must be a MAX-Heap.

FRAGE 40 von 180

MC_088 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 2_0**

Let the sequence 5,16,8,20,18,23,11 be the key values of a MIN-Heap visited in a level-order
traversal of the heap. What will be the sequence in a similar level-order traversal after an
EXTRACT_MIN operation? Assume that the level-order traversal visits nodes on the same
level, from left to right.

Wählen Sie eine Antwort:

- ☐ 8,11,16,18,20,23
- ☑ 8,16,11,20,18,23
- ☐ 8,16,20,18,23,11
- ☐ The given sequence does not represent a MIN-Heap.

FRAGE 41 von 180

offen_014 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 3_0**

Consider the dynamic programming algorithm for the Maximum Contiguous Subarray problem. Write down the subsequence values computed by the algorithm during the computation of the input sequence [6, -22, 11, 8].

The subsequence sums computed from index I to index j are shown as (I, j, sum) tuples: (0 1 -16), (0 2 -

5), (0 3 3), (1 2 -11), (1 3 -3), (2 3 19)

(1 point for each of the 6 tuples)

FRAGE 42 von 180

offen_015 DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 3_0

Consider the following Python function:
def f(num):
while num > 0:
print(str(num%2))
num //= 2
Write down what is printed by the program if called as f(49) and explain with reasons what the output signifies.

The program prints 1 0 0 0 1 1. The program is printing the bits i the binary representation of the integer num in reverse.

Scoring: 3 points for nature of output,2 points for cardinality, 3 points for exact numbers.

FRAGE 43 von 180

offen_068 DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 3_0

Name three approaches to formal verification.

1. Proof tools (2 points)

2. Model checkers (2 points)

3. Program annotation (2 points)

FRAGE 44 von 180

offen_071 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 3_0**

a. Briefly describe how model checkers are used in program verification.
b. Name one drawback of this method and two ways to circumvent it.

a. Model checkers use the program's state space. The system is specified using logic and desired

properties are validated (2 points).

b. Model checkers are unsuitable for large systems due to state space explosion(2 points). The

problem can be circumvented by using higher levels of abstraction (2 points)and by using

bounded model checkers (2 points).

FRAGE 45 von 180

offen_076 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 3_0**

Derive the time complexity of the following Python function executed on a Python list A of size N. The list has n positive integers followed by negative numbers.
def f(A):
i==1;
N == len(A)
while i<n::
i*=2
print("*")</n::

The lines i=1 and n=len(A) take $\Theta(1)$ time to execute (3 points).

Control enters the while loop if the index i is a valid index with i < N and A[i] is non-negative(2 points).

The value of i, which is initially 1, doubles in every iteration of the while loop(2 points).

After k iterations if i = 2 > n, control exits the while loop. Then k = log n + 1 = O(log n()3 points).

FRAGE 46 von 180

offen_077 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 3_0**

Let T(n) = 2n3 + 3n2 -25n +5. Show that T(n) = Θ(n3).

3n <= 3n3 for n >= 1 (1 point)

-25n <= n3 for n >= 1 (1 point)

5 < n3 for n >= 2 (1 point)

Hence T(n) <= 3n3 + n3 + n3 = 5n3 for n >= 2

Hence T(n) = O(n3) (2 points).

T(n) >= 2n3 + n(3n-25) + 5 >= 2n3 for n > = 9(2 points)

Hence T(n) = Ω(n3) (1 point)

Since T(n) = O(n3) and T(n) = Ω(n), T(n3) = Θ(n3) (2 points)

FRAGE 47 von 180

MC_015 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 3_0**

Which type of loop is present in C/C++ but not in Python?

Wählen Sie eine Antwort:

- ☑ do-while
- ☐ for
- ☐ repeat until
- ☐ while

FRAGE 48 von 180

MC_016 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 3_0**

Binary and linear are two recursive variants of the Fibonacci number algorithm. Which one of
the Fibonacci number algorithms runs faster?

Wählen Sie eine Antwort:

- ☐ Binary
- ☐ Both take an equal amount of time.
- ☑ Linear
- ☐ The answer varies with the argument n

FRAGE 49 von 180

MC_017 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 3_0**

Which type of induction assumes, as part of the Induction Hypothesis, that if ( ) for all <,
then P() is true?

Wählen Sie eine Antwort:

- ☐ Both weak and strong induction
- ☐ Neither weak nor strong induction
- ☑ Strong induction but not weak induction
- ☐ Weak induction but not strong induction

FRAGE 50 von 180

MC_092 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 3_0**

In Python, which of the following can be placed anywhere within a loop?
Answer option 1: Break
Answer option 2: Continue

Wählen Sie eine Antwort:

☑ Both answer 1 and 2 are correct.
☐ Neither answer 1 nor 2 is correct.
☐ Only answer 1 is correct.
☐ Only answer 2 is correct.

FRAGE 51 von 180

MC_094 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 3_0**

Which of the following is a correct set of types of objects that a for loop in Python can iterate
through?

Wählen Sie eine Antwort:

☐ Strings and lists only
☐ Strings and tuples only
☑ Strings, lists, and tuples
☐ Tuples and lists only

FRAGE 52 von 180

MC_096 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 3_0**

Which of the following are interactive theorem provers?

Wählen Sie eine Antwort:

☐ Automatic theorem provers
☐ Model checkers
☐ Program annotation tools
☑ Proof assistants

FRAGE 53 von 180

MC_101 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 3_0**

Which of the following denotes user-defined functions, which can iterate through a data
structure in some sequence?

Wählen Sie eine Antwort:

- ☐ Generators
- ☐ Iterables
- ☑ Iterators
- ☐ Sequencers

FRAGE 54 von 180

MC_102 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 3_0**

An algorithm runs in time T(n) = 2,000,000n. Which type of algorithm can this be classified
as?

Wählen Sie eine Antwort:

- ☐ Constant
- ☐ Exponential
- ☐ NP
- ☑ Polynomial

FRAGE 55 von 180

MC_103 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 3_0**

What does the following Python code print, if f(5) is invoked?
def f(n):
if (n < 0):return
print(n,end=" ")
f(n-1)

Wählen Sie eine Antwort:

- ☐ 1 2 3 4 5
- ☑ 5 4 3 2 1 0
- ☐ 5 4 3 2 1
- ☐ 5,
- ☐ 4,
- ☐ 3,
- ☐ 2,
- ☐ 1,
- ☐ 0

FRAGE 56 von 180

MC_105 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 3_0**

If the running time of an algorithm is multiplied by a factor of four each time the input size
doubles, what is the complexity of the algorithm?

Wählen Sie eine Antwort:

- ☐ Exponential
- ☐ Linear
- ☐ Log-Linear
- ☑ Quadratic

FRAGE 57 von 180

MC_107 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 3_0**

What is the time complexity of the following function, in terms of n?
def g(n):
if (n <= 1): return (1,0)
else:(a, b) = g(n-1);return (a+b, a)

Wählen Sie eine Antwort:

- ☐ Exponential
- ☑ Linear
- ☐ Logarithmic
- ☐ Quadratic

FRAGE 58 von 180

MC_108 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 3_0**

How many times is the number 25 printed by the following Python code snippet, if f(25) is
invoked?
def f(n):
if (n < 0):return;
print(n)
f(n-1);f(n-1)

Wählen Sie eine Antwort:

- ☐ 25 times
- ☐ An exponential number of times
- ☑ Once only
- ☐ Twice only

FRAGE 59 von 180

MC_110 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 3_0**

Jobs with service times of 20, 15, 25, 12, and 8 minutes are to be served by a single server.
What is the minimum possible cumulative waiting time of the jobs to be served, assuming that
the server can accept only one job at a time?

Wählen Sie eine Antwort:

- ☑ 55 minutes
- ☐ 60 minutes
- ☐ 75 minutes
- ☐ 80 minutes

FRAGE 60 von 180

MC_111 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 3_0**

If the Maximum Contiguous Subarray algorithm is run on all permutations of the sequence -
15, 25, -8, -3, 15, 20, -11, 33, what is the maximum sum obtained?

Wählen Sie eine Antwort:

- ☐ 57
- ☐ 59
- ☐ 71
- ☑ 93

FRAGE 61 von 180

offen_020 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 4_0**

Consider the insertion sort algorithm being applied to a partially sorted sequence, where each element is at most five steps away from its correct position in the sorted sequence.
a. How should insertion sort be updated to take advantage of the partially sorted
sequence?
b. What is the running time of the proposed algorithm for the partially sorted array?
c. Analyze the running time.

a. The standard insertion sort algorithm can be applied with no changes and this can take advantage of the partially sorted data (2 points).

b. The modified running time is O(n)(1 points).

c. Let the array be A. The insertion sort algorithm runs two nested loops. The outer loop runs from i= 2 to n-1. The inner loop runs from position i backwards, trying to insert A[i] at the right place.

Elements are shifted to the right one by one until we find one smaller than A[i]. In this case, such a position will be found within five iterations. Hence complexity = O(n) (3 points).

FRAGE 62 von 180

offen_021 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 4_0**

Consider the problem of merging k sorted integer sequences with a total of n integers stored
in arrays.
a. Briefly describe how this may be accomplished.
b. Find the time complexity of the algorithm in big-Oh notation in terms of n and k.

a. We can pair up the sequences two at a time and apply the binary merge. The number of sequences

reduce to k/2. Then pair up again and apply the merge. Stop when we have one merged sequence

(3 points) (Other solutions possible).

b. The running time is O(nlog k)(2 points). The number of sequences to be merged get halved in

each iterations. So if we start with k sequences we end up with one in log k steps. Since merge is a

linear algorithm, all the binary merges in each iteration together take O(n) time, where n is the total

number of elements in all the arrays together. Hence overall time = O(nlog k). (3 points) (Other

solutions possible).

FRAGE 63 von 180

offen_023 DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 4_0

Consider the sequence [1,2,3,4,5,6,7] represented as a MinHeap.
a. If we treat the MinHeap as a full binary tree, indicate which nodes are at which level, treating the root t as level 0.
b. Indicate the sequence of visited nodes in inorder, preorder, postorder and level order traversal.

a. (Node, Level) = (1, 1), (2, 1), (3, 2), (4, 2), (5, 2), (6, 2)[0.5 points for each entry; total 3 points].

b. Preorder = 1,2,4,5,3,6,7 (2 points). Inorder = 4,2,5,1,6,3,7 (2 points). Postorder = 4,5,2,6,7,3,1(2 points). Level order = 1,2,3,4,5,6,7(1 point).

FRAGE 64 von 180

offen_024 DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 4_0

The partitioning step of Quicksort separates out elements less than or equal to pivot from the
elements greater than pivot. Suppose we need to sort an array of 0s and 1s.
a. Explain how to do this using the partitioning step of quicksort.
b. Specify and analyze the running time of the algorithm.

a. We choose 0 as the pivot.(2 points). Then the elements less than or equal to the pivot are the 0

elements. Partitioning will get these on the left side of the array. (2 points). The elements greater

than pivot are the 1 elements. Partitioning will get these on the right side of the array. (2 points).

b. The running time is O(n) (2 points). This is because partitioning basically scans the array only

once. (2 points).

FRAGE 65 von 180

offen_079 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 4_0**

Briefly describe two problems that need to be solved in the process of designing a hashing scheme.

Designing a hash function which maps key values to locations of a 1-dimensional array(3 points).

2. Designing a collision resolution scheme if multiple key values map to the same location(3

points).

FRAGE 66 von 180

offen_090 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 4_0**

The inorder and preorder traversal of a binary tree yields the sequences 4, 2, 5, 1, 6, 3, 7 and 1, 2, 4, 5, 3, 6, 7 respectively. Indicate which elements are in the root and the left subtree of the root and explain why.

Root = 1 (1 point). This is because preorder traversal starts with 1 which must be the root (2 points).

Left subtree = 4, 2, 5 (3 points). This is because these nodes are visited prior to the root in the inorder traversal (2 points).

FRAGE 67 von 180

MC_022 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 4_0**

Which algorithmic paradigm does binary search follow?

Wählen Sie eine Antwort:

☐ Brute-force
☑ Divide-and-conquer
☐ Dynamic programming
☐ Greedy algorithm

FRAGE 68 von 180

MC_023 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 4_0**

A binary tree has three nodes. The root is labelled A, the leftchild B, and the rightchild C.
What is the sequence of nodes visited by preorder traversal?

Wählen Sie eine Antwort:

☑ A,B,C
☐ B,A,C
☐ B,C,A
☐ C,A,B

FRAGE 69 von 180

MC_027 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 4_0**

Binary search requires an array to be sorted in order for it to be applied. To search for a key in
an unsorted array, which of the following is asymptotically faster in the worst-case?
Answer option 1: Sort and apply binary search.
Answer option 2: Apply linear search without sorting.

Wählen Sie eine Antwort:

☐ Answer 1 is correct, but only if Quicksort is used.
☐ Both answer 1 and 2 would take the same amount of time.
☑ Only answer 1 is correct.
☐ Only answer 2 is correct.

FRAGE 70 von 180

MC_028 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 4_0**

A sequence of integers is maintained in a linked list L and on receiving a query integer q from
the user, L is searched using linear search. If it is known that the higher valued keys are
queried more frequently than lower valued keys, in what order should we store the sequence
in L to reduce search time?

Wählen Sie eine Antwort:

- ☐ Alternately increasing and decreasing order
- ☐ Non-decreasing order
- ☑ Non-increasing order
- ☐ The order does not matter.

FRAGE 71 von 180

MC_113 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 4_0**

Which of the following pair of tree traversal algorithms are both applicable to m-ary trees with
m=3?

Wählen Sie eine Antwort:

- ☐ Inorder and level order
- ☐ Inorder and postorder
- ☐ Inorder and preorder
- ☑ Preorder and postorder

FRAGE 72 von 180

MC_114 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 4_0**

What is the average number of comparisons for a successful linear search ?

Wählen Sie eine Antwort:

- ☐ O(1)
- ☐ O(log n)
- ☑ O(n)
- ☐ O(n/log n)

FRAGE 73 von 180

MC_115 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 4_0**

How much time would it take to search for a key in an unsorted array, if Merge Sort was
applied followed by a binary search?

Wählen Sie eine Antwort:

- ☐ O(log n)
- ☐ O(n)
- ☐ O(nlog log n)
- ☑ O(nlogn)

FRAGE 74 von 180

MC_117 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 4_0**

Which of the following sorting algorithms has O(nlog n) complexity?

Wählen Sie eine Antwort:

- ☐ Bubble Sort
- ☐ Insertion Sort
- ☑ Merge Sort
- ☐ Selection Sort

FRAGE 75 von 180

MC_122 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 4_0**

Consider a trie that is storing the following words: ant, and, angle, anger. How many vertices
does the trie have?

Wählen Sie eine Antwort:

- ☑ 10
- ☐ 12
- ☐ 14
- ☐ 15

FRAGE 76 von 180

MC_124 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 4_0**

If a trie and a Patricia trie are constructed using the same set of strings, which has the fewer
number of leaf nodes?

Wählen Sie eine Antwort:

- ☑ Both the trie and the Patricia trie have an equal number of leaf nodes.
- ☐ The Patricia trie has fewer leaf nodes.
- ☐ The trie has fewer leaf nodes.
- ☐ This question cannot be answered based on the information provided.

FRAGE 77 von 180

MC_126 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 4_0**

In the brute-force pattern matching algorithms for a text of size 70 and pattern of size 5, how
many shifts need to be checked?

Wählen Sie eine Antwort:

☐ 64
☐ 65
☑ 66
☐ 74

FRAGE 78 von 180

MC_129 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 4_0**

Which of the following sorting algorithms runs in linear time if invoked on an array which has
already been sorted?

Wählen Sie eine Antwort:

☐ Bubble sort
☑ Insertion sort
☐ Merge sort
☐ Selection sort

FRAGE 79 von 180

MC_130 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 4_0**

In hashing, using open addressing with collision resolution by linear probing, we have a table
of size 10 with elements in positions 0, 2, 3, 6, 7, 8 and 9. Under the simple uniform hashing
assumption, what is the probability of the next element being inserted into position 1?

Wählen Sie eine Antwort:

☐ 0.4
☐ 0.5
☑ 0.6
☐ 0.7

FRAGE 80 von 180

MC_133 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 4_0**

In hashing, using open addressing with chaining, if the number of elements n is proportional to the number of slots m, what is the complexity of the search operation?

Wählen Sie eine Antwort:

- ☑ O(1)
- ☐ O(log n)
- ☐ O(m)
- ☐ O(n)

FRAGE 81 von 180

offen_007 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 5_1**

Write a well formed XML document encoding a school classroom and including elements and attributes.

```
<school><classroom id="TerminalA">

  <student id="3" name="Anselm Lachmichtod"/>

  <student id="4" name="Guillaume Jerisdemevoirsibeau"/>

<school>
```

FRAGE 82 von 180

offen_008 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 5_4**

Write a valid JSON document encoding a school classroom and including arrays and properties.

```
{id="TerminalA", students:[
```

{id:3, name:"Anselm Lachmichtod"},

{id:4, name:"Guillaume Jerisdemevoirsibeau"}]}

FRAGE 83 von 180

offen_009 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 5_1**

What are XML documents made of? List three answers.

Elements (2 points), attributes (2 points), text tags (2 points).

FRAGE 84 von 180

offen_010 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 5_2**

Name three XML parsing libraries for Python and their differences.

ElementTree: easier to learn, in memory

Minidom: Standardised API, in memory.

SAX: stream-based, standardised.

Approximate names: (3 points) Exact names (6 points). Relevant differences (2 points) Matching differences (4 points).

FRAGE 85 von 180

offen_013 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 5_4**

Name three differences between JSON and XML.

- JSON has a compact syntax but XML's syntax has multiple repetitions (2 points).
- JSON uses properties, arrays and object while XML used elements and attributes (2 points).

- JSON does define how to specify schemas or DTDs while XML does (2 points). => JSON does not define how to specify schemas or DTDs in the document while XML does (2 points)

FRAGE 86 von 180

offen_015 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 5_3**

Provide XSLT code to extract the text of elements "t" children of the root element.

<?xml version="1.0"?><xsl:stylesheet version="1.0" xmlns:xsl ="http://www.w3.org/1999/XSL/Transform"> <xsl:template match="/"><xsl:apply-templates select="t"></xsl:template> <xsl:template match="t"><xsl:value-of select="text()"/></xsl:template></xsl:stylesheet>

FRAGE 87 von 180

MC_180 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 5_1**

What is the purpose of defining a language agnostic data storage format such as JSON or XML?

Wählen Sie eine Antwort:

☑ To allow editors in different programming languages.

☐ To define structures that faithfully represent the data-structures of the programming languages.

☐ To make sure all knowledge structures can be represented by possibly mixing the content formats.

☐ To make sure developers choose the optimal storage format for each purpose that can be changed at any time.

FRAGE 88 von 180

MC_181 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 5_3**

What is the purpose of XSLT?

Wählen Sie eine Antwort:

- ☐ Adding style information to the XML document.
- ☐ Exchanging the content of two documents in a styled way.
- ☐ Extending the document with markup.
- ☑ Transforming XML documents to other document formats.

FRAGE 89 von 180

MC_182 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 5_4**

Which programming language was the inspiration for JSON?

Wählen Sie eine Antwort:

- ☐ C
- ☐ HTML
- ☐ Java
- ☑ JavaScript

FRAGE 90 von 180

MC_183 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 5_5**

The structure of a YAML document is…

Wählen Sie eine Antwort:

- ☐ ...array-like.
- ☐ ...heap-like.
- ☐ ...row-like.
- ☑ ...tree-like.

FRAGE 91 von 180

MC_186 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 5_4**

Which of the following fragments is a valid example of JSON?

Wählen Sie eine Antwort:

- ☐ { "key": ["value" {"k": 12}] }
- ☐ { "key": ["value", {"k" 12}] }
- ☑ { "key": ["value", {"k": 12}] }
- ☐ { "key": ["value", {k: 12}] }

FRAGE 92 von 180

MC_187 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 5_1**

Which of the following fragments is a well-formed XML document?

Wählen Sie eine Antwort:

- ☐ <x> go leave <x>
- ☐ <x> go <leave> </x>
- ☑ <x> go leave </x>
- ☐ <x> go leave </x>

FRAGE 93 von 180

MC_188 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 5_2**

Which library parses XML in a streamed fashion in Python?

Wählen Sie eine Antwort:

- ☐ JDOM
- ☐ xml.dom
- ☑ xml.sax
- ☐ xml.stax

FRAGE 94 von 180

MC_189 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 5_2**

Why is DOM-like parsing a problem with very large documents?

Wählen Sie eine Antwort:

- ☑ Because it has to store the tree as a series of objects in memory.
- ☐ Because it is difficult to understand.
- ☐ Because it only has a standardised API.
- ☐ Because it reads the XML into a string before.

FRAGE 95 von 180

MC_191 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 5_3**

Which of these assertions are correct:
1) XSLT operates on a push basis: templates are called by their selectors on the current element
2) XSLT operates on a pull basis: elements are processed by picking them using selectors

Wählen Sie eine Antwort:

- ☑ Both 1) and 2) are true.
- ☐ Neither is true.
- ☐ Only 1) is true.
- ☐ Only 2) is true.

FRAGE 96 von 180

MC_192 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 5_4**

What are the typical constituents of JSON structures?

Wählen Sie eine Antwort:

- ☐ Objects, attributes, arrays, and values.
- ☐ Objects, children, and attributes.

☑ Objects, properties, arrays, and values.
☐ Values and arrays.

FRAGE 97 von 180

MC_193 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 5_1**

XML documents are made of…

Wählen Sie eine Antwort:

☐ ...elements and properties.
☑ ...elements, attributes, texts and processing instructions.
☐ ...tags and attributes.
☐ ...texts and arrays.

FRAGE 98 von 180

MC_194 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 5_4**

Which example is a valid JSON document?

Wählen Sie eine Antwort:

☐ ['key': "value"]
☑ {"key": "value"}
☐ {'key': "value"}
☐ {key: "value"}

FRAGE 99 von 180

MC_203 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 5_1**

How are attributes delimited in XML?

Wählen Sie eine Antwort:

☐ With the characters ampersand (&) and semicolons (;).
☑ With the characters quote (") or apostrophe ('), and with space ( ) and equality (=).
☐ With the characters quote ("), comma (,) and equality (=).

☐ With the characters quote ("), tabs ( ) and dash (-).

FRAGE 100 von 180

MC_205 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 5_3**

What does the following code do for arbitrary source documents?<xsl:for-each select="storage/article"> <xsl:value-of select="order_number"/> </xsl:for-each>

Wählen Sie eine Antwort:

☐ It extracts the text of each order_number descending of the storage elements.
☑ It extracts the text of the order-numbers child of each article element below the storage elements, surrounded by p elements.
☐ It outputs p elements for each order_number and puts its text inside.
☐ It wraps each order_number elements in a p element.

FRAGE 101 von 180

offen_025 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 6_0**

Calculate Radon's cyclomatic complexity letter grade for a score of 28.

H(5-score) = H(-23)=0.(2 points). Rank. 28/10 = 2.8. Ceiling(2.8) = 3 (2 points). Letter grade for 3 is D.

(2 poins).

FRAGE 102 von 180

offen_026 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 6_0**

Explain how the cyclomatic complexity is related to the number 14 of the binary predicates in a control flow graph. Explain your reasoning.

If all 14 predicates of a control flow graph are binary predicates, the cyclomatic complexity is 14+1=15.(2 points). The cyclomatic complexity of a single straight line

graph with 2 vertices and 1 edge is e-v+2 = 1. (2 points) Each of the 14 predicates add 2 edges and 1 vertex, adding 2-1=1 to the count.(2 points).

FRAGE 103 von 180

offen_027 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 6_0**

Briefly describe the key features of four document generation tools.

Doxygen can be used to generate documentation for C, C#, Java, Python, and PHP. It can generate a

HTML file for online browsing or a Latex file for creating an offline manual (2 points).

Sphinx generates automatic cross-referencing links for functions and classes and creates indices. It also

allows customization through user-defined indices. It also uses the powerful reStructuredText markup

language (2 points).

Pdoc has a simple usage wherein the documentation is simply entered as a markdown. Moreover, pdoc

automatically links identifiers in Python docstrings to corresponding documentation (2 points).

Pydoc is an online help system and code documentation generator in Python. The code documentation

may be obtained as text or HTML. The documentation is derived from docstrings. (2 points).

FRAGE 104 von 180

offen_028 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 6_0**

Let us define the ML function fun square(x) = x*x;
Under what circumstances does ML infer the types of the return value and parameter as integer and real?

If no types are specified, the type of return value and parameter x are inferred to be integers(2 points). If the return value type is specified as real, the types of return value and parameter x are inferred to be reals (3 points). If the parameter type is specified as real, the types of return value and parameter x are

inferred to be reals (3 points).

FRAGE 105 von 180

offen_029 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 6_0**

Briefly describe five code optimization techniques.

a. Making small functions inline. We can replace function calls with the code for the function. This

helps improve performance in case of small functions.(2 points)

b. Taking repetitive computations outside loops (2 points)

c. Elimination of common subexpressions(2 points).

d. Eliminating unreachable code. (2 points).

e. Reduction in strength. Operations can often be replaced by alternatives which are more efficient.(2

points).

FRAGE 106 von 180

offen_030 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 6_0**

Briefly describe Chung's data flow complexity based on live variable referencing.

A definition of a variable v occursin a statement whenever there is an assignment of a value to v. A

definition clear path to v is a path in which v is not reassigned(2 points). The definition of a variable v

reaches the top of a block b of code if, and only if, there is a definition clear path from the definition of v

to the top of block b (2 points). Analogously, we can describe the notion of the definition of v reaching

the bottom of b (1 point). The definition of v is live at the top of b, if the definition reaches the top of b

and it is referenced later (2 points). Variable v is live at the top or bottom of a block b if there is a live

definition of v (1 point). The total number of live variables in a block orsum total of live definitions of

all live variables in the block are suitable complexity measures (2 points).

FRAGE 107 von 180

MC_029 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 6_0**

What is a variable between its first and last reference within a function called?

Wählen Sie eine Antwort:

- ☐ Active variable
- ☑ Live variable
- ☐ Referenced variable

☐ Running variable

FRAGE 108 von 180

MC_031 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 6_0**

For a programming language, what defines the set of rules that governs what types to assign
to variables and expressions?

Wählen Sie eine Antwort:

☐ Type coercion
☐ Type constraints
☐ Type inference
☑ Type system

FRAGE 109 von 180

MC_032 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 6_0**

A control flow graph with ten edges has a cyclomatic complexity of four. How many vertices
does it have?

Wählen Sie eine Antwort:

☑ Eight
☐ Nine
☐ Seven
☐ Six

FRAGE 110 von 180

MC_033 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 6_0**

What do we call the average number of live variables per statement in a block of code?

Wählen Sie eine Antwort:

- ☐ Chung's data flow complexity
- ☐ Cyclomatic complexity
- ☑ Dunsmore's data flow complexity
- ☐ Radon's complexity

FRAGE 111 von 180

MC_034 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 6_0**

In the cyclomatic complexity implementation in Radon, for which range of scores is the letter
grade B assigned?

Wählen Sie eine Antwort:

- ☐ 11 to 19
- ☐ 11 to 20
- ☐ 2 to 5
- ☑ 6 to 10

FRAGE 112 von 180

MC_035 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 6_0**

When can a control flow graph with twelve edges and ten vertices have a cyclomatic
complexity of six?

Wählen Sie eine Antwort:

- ☐ It is never possible.
- ☐ When it has six loops.
- ☑ When it has two components
- ☐ When it is a straight line program.

FRAGE 113 von 180

MC_135 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 6_0**

What is the name of the optimizations that are applied to a small amount of code in a sliding
window?

Wählen Sie eine Antwort:

- ☐ Local window optimization
- ☑ Peephole optimization
- ☐ Sliding window optimization
- ☐ Small window optimization

FRAGE 114 von 180

MC_136 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 6_0**

Suppose an assignment statement has a variable on its left-hand side and the variable is
never used. In compiler optimization, what do we call the removal of such statements?

Wählen Sie eine Antwort:

- ☐ Removal of redundant assignments
- ☑ Removal of redundant stores
- ☐ Removal of redundant variable
- ☐ Removal of unused assignments

FRAGE 115 von 180

MC_137 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 6_0**

What do we call the mapping of values to hardware registers during code generation?

Wählen Sie eine Antwort:

- ☑ Register allocation
- ☐ Register generation
- ☐ Register mapping
- ☐ Value mapping

FRAGE 116 von 180

MC_145 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 6_0**

Which document generator tool uses the reStructuredText markup language?

Wählen Sie eine Antwort:

- ☐ Javadoc
- ☐ Pdoc
- ☐ Pydoc
- ☑ Sphinx

FRAGE 117 von 180

MC_146 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 6_0**

Code coverage is applicable to which of the following testing stages?
Answer option 1: Unit Testing
Answer option 2: Integration Testing

Wählen Sie eine Antwort:

- ☑ Both answer 1 and 2 are correct.
- ☐ Neither answer 1 nor 2 is correct.
- ☐ Only answer 1 is correct.
- ☐ Only answer 2 is correct.

FRAGE 118 von 180

MC_150 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 6_0**

What is the output of the following Python program?

```
y=1
if 0==1: y=2
else: y="B"
print(y)
```

Wählen Sie eine Antwort:

- ☐ 1
- ☐ 2
- ☑ B
- ☐ It prints an error message.

FRAGE 119 von 180

MC_151 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 6_0**

What is the output of the following Python program?

```
x=12;y="1+2"
if x==y: x="1+2"
else: y=1+2
print(y)
```

Wählen Sie eine Antwort:

- ☐ 12
- ☑ 3
- ☐ It prints an error message.
- ☐ The string “12”

FRAGE 120 von 180

MC_154 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 6_0**

Consider the Python assert statements below and indicate in which case(s) an AssertionError exception would be thrown, assuming f() returns 3.
Answer option 1: assert f() == 2
Answer option 2: assert f() == 2, "ERROR"

Wählen Sie eine Antwort:

- ☑ Both answer 1 and 2 are correct.
- ☐ Neither answer 1 nor 2 is correct.
- ☐ Only answer 1 is correct.
- ☐ Only answer 2 is correct.

FRAGE 121 von 180

offen_031 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 7_0**

Distinguish between functional programming and logic programming.

Functional programming models a problem of computation as a collection of mathematical functions.

Languages supporting this style of programming provide a set of primitive functions, functional forms

which allows construction of complex forms and structures to represent data (3 points).

Logic programming follows a declarative style of programming. Programs written in such languages

specify the goals of the computation rather than details of an algorithm to reach the goal (3 points).

FRAGE 122 von 180

offen_032 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 7_0**

Briefly describe the three types of concurrency involving programs executing on a computer.

Multithreading allows multiple tasks belonging to the same program(2 points).

Multiprogramming allows multiple programs working on the same processor(2 points).

Multiprocessing allows multiple processors to work together(2 points).

FRAGE 123 von 180

offen_108 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 7_0**

a. If an "else" is preceded by multiple "if" statements, with which "if" is the "else" paired up in C, C++, and Python?
b. How is the default behavior overridden in C/C++?

a. In C the else is paired up with the closest if by default(2 points). In C++ the else is paired up by with the closest if by default (2 points). In Python the pairing is done usingindentation (2 points).

b. The default behaviour is overridden in C and C++ by using parentheses.(2 points).

FRAGE 124 von 180

offen_110 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 7_0**

Name and briefly describe four basic CPU scheduling algorithms.

First-come, first-served: The process that requests first is selected (2 points).

Shortest job first: The process whose next CPU burst is the smallest is selected(2 points).

Round-robin: Each process is selected in turn, and the CPU is allocated for a quantum of time(2

points).

Priority scheduling: Each process has a priority, and the process with the highest priority is selected to

be scheduled (2 points).

FRAGE 125 von 180

offen_113 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 7_0**

What is the result of each of the following computations in Python:
a. 1==1+1
b. (1==1) + 1
c. (1==1)+1.0
d. Briefly describe the implicit type conversion that takes place during the following computations in Python:
(1==1) + 1, 1==1+1.0, (1==1)+1.0,

a. 1==1+1 evaluates to False(1 point).

b. 1==1)+1 evaluates to 2(1 point).

c. 1==1+1.0 evaluates to False(1 point).

d. (1==1)+1.0 evaluates to 2.0(1 point). (1==1)+1 evaluates with the result True of the expression 1==1 implicitly converted to an integer1(2 points). For the evaluation 1==1+1.0, an int to float conversion takes place (2 points).

(1==1)+1.0 evaluates to 2.0 and the boolean resultTrue from the subexpression 1==1 is converted to 1.0(2 points).

FRAGE 126 von 180

offen_114 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 7_0**

Name and briefly explain what is printed by the two print statements in the following Python code fragment below:
def printxy():
global y
x=2
y=2
print(x, y)
x=1;y=2
printxy()
print(x,y)

The first print(x,y) statement prints 2 (1 point) and 2 (1 point) as values of x and y, respectively. In this case, the print statement simply prints the values of x and y which are locally updated within the function (2 points).

The second print(x,y) statement prints 1(2 points) and 2 (2 points) as values of x and y, respectively. In this case, y being a global variable it holds the updated value 2. In case of x, a local variable was assigned inside the function and hence the old value of 1 is printed (2 points).

FRAGE 127 von 180

MC_036 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 7_0**

Which programming style is command driven or statement oriented?

Wählen Sie eine Antwort:

- ☐ Functional
- ☑ Imperative
- ☐ Logical
- ☐ Object-oriented

FRAGE 128 von 180

MC_037 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 7_0**

Which of the following involves allowing multiple tasks associated with the same program?

Wählen Sie eine Antwort:

- ☐ Multiprocessing
- ☐ Multiprogramming
- ☐ Multitasking
- ☑ Multithreading

FRAGE 129 von 180

MC_039 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 7_0**

A process continues to run until it is forced to wait for the termination of another process.
Under which type of scheduling policy would this occur?

Wählen Sie eine Antwort:

- ☐ First-come, first-served
- ☐ Neither preemptive nor non-preemptive
- ☑ Non-preemptive
- ☐ Preemptive

FRAGE 130 von 180

MC_040 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 7_0**

Which scheduling algorithm could benefit most from use of a Heap?

Wählen Sie eine Antwort:

- ☐ First-come, first-served
- ☐ Longest job first
- ☑ Priority scheduling

☐ Round robin

FRAGE 131 von 180

MC_041 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 7_0**

What does (lambda x: x+x)("3") yield in Python?

Wählen Sie eine Antwort:

☑ "33"
☐ 33
☐ 6
☐ 8

FRAGE 132 von 180

MC_042 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 7_0**

Which of the following is a possible valid result of applying the partition on the list L =
[11,59,26,17,2,1,25,9,3,15] using 11 as the pivot?

Wählen Sie eine Antwort:

☐ [2, 3, 59, 1, 11, 17, 25, 26, 9, 15]
☑ [2, 3, 9, 1, 11, 17, 25, 26, 59, 15]
☐ [2, 3, 9, 1, 15, 17, 25, 26, 59, 11]
☐ [2, 3, 9, 17, 11, 1, 25, 26, 59, 15]

FRAGE 133 von 180

MC_157 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 7_0**

If after an assignment a = b, both a and b can be modified without affecting each other, which
of the following is illustrated?

Wählen Sie eine Antwort:

- ☐ Assignment semantics
- ☑ Copy semantics
- ☐ Reference semantics
- ☐ Value semantics

FRAGE 134 von 180

MC_158 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 7_0**

Which type of access control in C++ allows variables to be accessed in the class in which they
are defined and also in derived classes?

Wählen Sie eine Antwort:

- ☐ Friend
- ☐ Private
- ☑ Protected
- ☐ Public

FRAGE 135 von 180

MC_159 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 7_0**

What do we call the lowest level of meaningful syntactic units in a programming language?

Wählen Sie eine Antwort:

- ☐ Identifiers
- ☑ Lexemes
- ☐ Values
- ☐ Variables

FRAGE 136 von 180

MC_160 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 7_0**

Which types of grammar are best known to capture the syntax of programming languages?

Wählen Sie eine Antwort:

- ☐ Attribute grammars
- ☑ Context free grammars
- ☐ Context sensitive grammars
- ☐ Regular grammars

FRAGE 137 von 180

MC_165 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 7_0**

What is the output of the following Python program?
b=2
c=b=1
print(c)

Wählen Sie eine Antwort:

- ☑ 1
- ☐ 2
- ☐ False
- ☐ True

FRAGE 138 von 180

MC_166 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 7_0**

In Python, the addition of two numbers a and b, where a is an integer and b is a floating-point
number, involves which of the following steps?

Wählen Sie eine Antwort:

☐ a is explicitly converted to a floating-point number.
☑ a is implicitly converted to a floating-point number.
☐ b is explicitly converted to an integer.
☐ b is implicitly converted to an integer.

FRAGE 139 von 180

MC_170 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 7_0**

What does the following Python program print?

```
a=[2,3,4,5]
b=a
a[0]=0
print(b)
```

Wählen Sie eine Antwort:

☑ [0, 3, 4, 5]
☐ [0,2,3,4,5]
☐ [0,2,3,4]
☐ [2,3,4,5]

FRAGE 140 von 180

MC_174 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 7_0**

What does (1==1)+1 print in Python?

Wählen Sie eine Antwort:

☐ 1
☑ 2
☐ An error message
☐ True

FRAGE 141 von 180

offen_115 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 8_0**

Name three types of variables defined in Java classes, which are visible within classes defined in the same package.

Public variables (2 points), protected variables (2 points), and variables with no access specifiers (2 points)

FRAGE 142 von 180

offen_116 **DLBIADPS01-01_klausurfrage_OQ_easy/Lektion 8_0**

List three important features related to support for generics in Java.

Java supports type parameterized classes (2 points).

It supports creation ofgeneric functions with type parameterized arguments (2 points).

Support is also provided forwildcard types (2 points).

FRAGE 143 von 180

offen_119 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 8_0**

List four salient features of the Ada programming language.

Encapsulation supported by means of packages (2 points).

User-defined exception handling (2 points).

Procedures can be defined with parameters of unspecified types(2 points).

Support for concurrency is provided through the rendezvous mechanism for synchronization and

communication (2 points).

FRAGE 144 von 180

offen_120 **DLBIADPS01-01_klausurfrage_OQ_medium/Lektion 8_0**

a. Define the nonstrict property of programming languages.
b. Name one language that is nonstrict.
c. Name two ways in which the nonstrict property is useful.

a. The nonstrict property allows a function to be evaluated, even if all actual parameters are not

evaluated (3 points).

b. Haskell is nonstrict(1 point) (Other examples include languages like Miranda and Clean,

which are not covered in the script, but are acceptable).

c. Two ways in which the nonstrict property is useful:

1. Lazy evaluation can be followed which allows some evaluation to be avoided(2 points).

2. It allows infinite lists to be supported(2 points).

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offen_124 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 8_0**

a. Describe and exemplify the LIST function in Lisp.
b. Describe and exemplify the CONS function in Lisp.

a. LIST takes zero or more arguments and returns a list of those arguments(3 points). Example

(LIST 'A '(B C)) creates a list (A (B C)) (2 points).

b. CONS takes two arguments arg1 and arg2 and returns a list whose first element is arg1 and

the rest of the list are the elements of arg2 (3 points). Example: (CONS 'A '(B C)) creates a list

(A B C) (2 points).

FRAGE 146 von 180

offen_126 **DLBIADPS01-01_klausurfrage_OQ_hard/Lektion 8_0**

a. What is the Lisp syntax following the expression 3n+2?
b. What is the Lisp syntax following the anonymous function with argument n that
computes the expression?
c. What is the Lisp syntax following evaluation of the function at n=5?
d. What is the Lisp syntax after the answer has been printed?

a. (+ (* 3 n) 2)(2 points)

b. (LAMBDA (n) (+ (* 3 n) 2))(3 points)

c. ((LAMBDA (n) (+ (* 3 n) 2)) 5)(3 points)

d. (print ((LAMBDA (n) (+ (* 3 n) 2)) 5))(2 points)

FRAGE 147 von 180

MC_044 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 8_0**

Which output/s does WasmFiddle generate?

Wählen Sie eine Antwort:

- ☐ WASM only
- ☐ WASMF
- ☑ WAT and WASM
- ☐ WAT only

FRAGE 148 von 180

MC_045 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 8_0**

Which keyword in C++ marks a region in the program that defines the scope for identifiers
declared inside it?

Wählen Sie eine Antwort:

- ☐ block
- ☐ mark
- ☑ namespace
- ☐ scope

FRAGE 149 von 180

MC_046 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 8_0**

What does (int)x in C represent?

Wählen Sie eine Antwort:

- ☐ Implicit type conversion
- ☑ Type casting
- ☐ Type coercion
- ☐ Type promotion

FRAGE 150 von 180

MC_047 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 8_0**

Assume we use WasmFiddle to generate WAT code for a C function int factorial(int n). In the
WAT code, which keyword represents the integer being returned by the function?

Wählen Sie eine Antwort:

- ☐ local

- ☐ param
- ☑ result
- ☐ return

FRAGE 151 von 180

MC_176 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 8_0**

What is the enviroment called in which the Java bytecode is executed?

Wählen Sie eine Antwort:

- ☐ Bytecode compiler
- ☐ Bytecode simulator
- ☐ Java Virtual Environment
- ☑ Java Virtual Machine

FRAGE 152 von 180

MC_177 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 8_0**

In Java, a variable of type int can be promoted to which of the following types?

Wählen Sie eine Antwort:

- ☐ byte
- ☐ char
- ☑ float
- ☐ short

FRAGE 153 von 180

MC_178 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 8_0**

Which feature in Java is a support for type parameterized classes?

Wählen Sie eine Antwort:

- ☑ Generics
- ☐ Interfaces

☐ Packages
☐ Templates

FRAGE 154 von 180

MC_179 **DLBIADPS01-01_klausurfrage_SC_easy/Lektion 8_0**

In Java, into which of the following types can a variable of type float be promoted?

Wählen Sie eine Antwort:

☑ double
☐ int
☐ long
☐ short

FRAGE 155 von 180

MC_188 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 8_0**

In Lisp, what does the following print?
(print (CONS 'A '((B C))))

Wählen Sie eine Antwort:

☐ ((A B) C)
☑ (A (B C))
☐ (A B C)
☐ A B C

FRAGE 156 von 180

MC_190 **DLBIADPS01-01_klausurfrage_SC_medium/Lektion 8_0**

What is the mechanism for synchronization between a pair of tasks in Ada called?

Wählen Sie eine Antwort:

☐ A conference
☐ A handshake
☐ A meeting
☑ A rendezvous

FRAGE 157 von 180

MC_192 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 8_0**

In Lisp what does the following print?
(print (CADR '(A (B C))))

Wählen Sie eine Antwort:

☐ ((B C))
☑ (B C)
☐ An error message
☐ B C

FRAGE 158 von 180

MC_193 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 8_0**

Which of the following is true about C# access modifiers with respect to members defined in a
class C in an assembly A?

Wählen Sie eine Antwort:

☐ Internal members are accessible in classes derived from C outside the assembly A.
☑ Protected internal members are accessible in classes derived from C outside the assembly A.
☐ Protected internal members are not accessible in classes other than those derived from C.
☐ Protected members are not accessible in classes derived from C but outside assembly A.

FRAGE 159 von 180

MC_195 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 8_0**

What is the output of the following Haskell program?

```
part (i:j) = [x|x<-j, x < i]++[i]++[x|x<-j, x > i]
main = do
print $ part [1,1,0,1,0,0,1,0,1,0,1]
print $ part [0,1,0,1,0,0,1,0,1,0,1]
```

Wählen Sie eine Antwort:

- ☐ [0,0,0,0,0,1,1,1,1,1,1]
- ☐ [0,0,0,0,0,1,1,1,1,1,1]
- ☑ [0,0,0,0,0,1]
- ☑ [0,1,1,1,1,1]
- ☐ [0,1,1,1,1,1,1]
- ☐ [0,1]
- ☐ [0,1]
- ☐ [0,1]

FRAGE 160 von 180

MC_196 **DLBIADPS01-01_klausurfrage_SC_hard/Lektion 8_0**

Which of the following statements is correct?

Wählen Sie eine Antwort:

- ☐ Linear search in Haskell does not work on infinite lists.
- ☐ Linear search in Haskell works on infinite lists but only for successful searches.
- ☐ Linear search in Haskell works on infinite lists but only for unsuccessful searches.
- ☑ Linear search in Haskell works on infinite lists.

FRAGE 161 von 180

MC_009 **DLBIADPS01-01_exercise-question_SC_easy/Übungsklausur_0**

In a MaxHeap of n elements, how much time does an insert operation take?

Wählen Sie eine Antwort:

- ☐ O(1)
- ☑ O(log n)
- ☐ O(n)
- ☐ O(nlogn)

FRAGE 162 von 180

MC_118 **DLBIADPS01-01_exercise-question_SC_easy/Übungsklausur_0**

Which trie variant always stores one letter per edge?
Answer option 1: Regular trie
Answer option 2: Patricia trie

Wählen Sie eine Antwort:

- ☐ Both answer 1 and 2 are correct.
- ☐ Neither answer 1 nor 2 is correct.
- ☑ Only answer 1 is correct.
- ☐ Only answer 2 is correct.

FRAGE 163 von 180

MC_138 **DLBIADPS01-01_exercise-question_SC_easy/Übungsklausur_0**

What is the correct order in which the following are performed?
Answer option 1: Unit testing
Answer option 2: Integration testing

Wählen Sie eine Antwort:

- ☑ Answer 1 followed by 2.
- ☐ Answer 2 followed by 1.

☐ Only one of them is performed.
☐ The order does not matter.

FRAGE 164 von 180

MC_038 **DLBIADPS01-01_exercise-question_SC_easy/Übungsklausur_0**

Which of the following programming styles can be regarded as declarative?

Wählen Sie eine Antwort:

☐ Block structured
☐ Imperative
☑ Logic programming
☐ Procedural

FRAGE 165 von 180

DLBIADPS01-01_exercise-question_SC_easy/Übungsklausur_0

Which of the following are high-level, compiled languages?

Wählen Sie eine Antwort:

☑ Java and C
☐ R and Swift
☐ JavaScript and C++
☐ Python and C#

FRAGE 166 von 180

DLBIADPS01-01_exercise-question_SC_easy/Übungsklausur_0

Which of the following models the contents of a data structure and the operations that are supported without detailing how the operations are implemented?

Wählen Sie eine Antwort:

☑ Abstract data type
☐ Concrete data type
☐ Polymorphism

☐ Data encapsulation

FRAGE 167 von 180

MC_189 **DLBIADPS01-01_exercise-question_SC_medium/Übungsklausur_0**

What is the structure of a DOM?

Wählen Sie eine Antwort:

☐ A connected graph with cycles
☐ A directed acyclic graph, but not a tree
☐ A graph, not necessarily connected, but with cycles
☑ A tree or a forest of trees

FRAGE 168 von 180

MC_147 **DLBIADPS01-01_exercise-question_SC_medium/Übungsklausur_0**

What do we call the number of linearly independent paths in the control flow graph of a
program?

Wählen Sie eine Antwort:

☐ Control flow complexity
☑ Cyclomatic complexity
☐ Linear path complexity
☐ Referential complexity

FRAGE 169 von 180

MC_184 **DLBIADPS01-01_exercise-question_SC_medium/Übungsklausur_4**

What is a natural way to represent a list of objects in XML and JSON?

Wählen Sie eine Antwort:

☐ XML elements are equivalent
☐ JSON: simply align JSON lines below each other.

☐ XML: repeated attributes.
☐ JSON: array construct([…])
☑ XML: repeated children of an element
☑ JSON: array construct ([…]).
☐ XML: repeated children of an element
☐ JSON: repeated properties

FRAGE 170 von 180

MC_104 **DLBIADPS01-01_exercise-question_SC_medium/Übungsklausur_0**

What is the running time complexity of the following nested loops in Python?
for i in range(0,n):
count=n;
while count > 0: count//= 2

Wählen Sie eine Antwort:

☐ O(log n)
☑ O(n log n)
☐ O(n)
☐ O(nlog log n)

FRAGE 171 von 180

MC_132 **DLBIADPS01-01_exercise-question_SC_hard/Übungsklausur_0**

Consider a hash table with eight locations maintained using open addressing with quadratic
probing as the collision resolution scheme. The probe sequence for a key k is generated by
h(k) + i(i+1). If h(k)=3, which locations of the table are never visited by the probe sequence?

Wählen Sie eine Antwort:

☑ All even positions
☐ All odd positions
☐ Positions 0 and 4

☐ Positions 1 and 5

FRAGE 172 von 180

MC_152 **DLBIADPS01-01_exercise-question_SC_hard/Übungsklausur_0**

What is the output of the following SOSML program?
fun f(x, y:real, z):real = x*(y+z);
print(f(2.5,3.0,2.5));

Wählen Sie eine Antwort:

☐ 10.0
☑ 13,75
☐ 14
☐ It prints an error message.

FRAGE 173 von 180

MC_171 **DLBIADPS01-01_exercise-question_SC_hard/Übungsklausur_0**

What does the following Python program print?
a=[2,3,4,5]
b=a[:]
a[0]=0
print(b)

Wählen Sie eine Antwort:

☐ [0,2,3,4]
☐ [0,3,4,5]
☑ [2,3,4,5]
☐ [2,3,4]

FRAGE 174 von 180

MC_191 **DLBIADPS01-01_exercise-question_SC_hard/Übungsklausur_0**

What is the output of e following Lisp code?
(print ((LAMBDA (a b) (* (+ 3 a) (+ 5 b) 2)) 3 2))

Wählen Sie eine Antwort:

- ☐ 42
- ☑ 84
- ☐ 90
- ☐ An error message

FRAGE 175 von 180

offen_080 **DLBIADPS01-01_exercise-question_OQ_easy/Übungsklausur_0**

Name and briefly describe two broad categories of collision resolution schemes in hashing.

Chaining (1 point): Each location in the hash table has a linked list of keys, which has been mapped

by the hash function to that location (2 points).

2. Open Addressing (1 point): All items are stored in the hash table directly and for collisions, we

search for alternative positions within the table itself (2 points).

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DLBIADPS01-01_exercise-question_OQ_easy/Übungsklausur_0

Name three methods of representing algorithms and name one disadvantage of each method.

Natural Language. Disadvantage: It is ambiguous.

Flowchart. Disadvantage: Does not scale well.

Pseudocode. Disadvantage: No standard syntax.

(1 point per method, 1 point per example)

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offen_062 DLBIADPS01-01_exercise-question_OQ_medium/Übungsklausur_0

Name and briefly describe three types of polymorphism.

In ad-hoc polymorphism, a function can have different implementations depending on the types of its

arguments (3 points).

In polymorphism with inheritance, a method can have different implementations in different classes in a

class hierarchy (3 points).

In polymorphism using templates or generic types, a function can have parametrized data types (2 points).

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offen_122 DLBIADPS01-01_exercise-question_OQ_medium/Übungsklausur_0

a. Describe a C# assembly.
b. List three components of an assembly.

a. In C#, an assembly is an encapsulation construct that islarger than a class and is defined

over multiple files (2 points).

b. Components of an assembly include

i. its program code in the Common Intermediate Language(2 points),

ii. metadata describing every class defined in the assembly andexternal classes used (2 points), and

iii. a collection of all other assemblies referenced and the version number (2 points).

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offen_018 **DLBIADPS01-01_exercise-question_OQ_hard/Übungsklausur_0**

A palindrome is a string that reads the same forwards and backwards. Consider the following recursive algorithm (written in a Python-like pseudocode) for checking whether a given string is a palindrome:
pal(s):
if length(s) <= 1:
return True
else:
return s[0] == s[-1]and pal(s[1:-1])
Prove that the algorithm is correct.

Proof is by strong induction on n, the length of the string. Basis: for n=0, the empty string is by default a palindrome and the function correctly returns True (2 points). For n=1, the singleton string is again a palindrome and the function correctly returns True (2 points). Induction hypothesis: Let the length n ≥ 2.

Let us assume that the algorithm works correctly for all strings of length k < n (2 points). Check if the first and last characters of the string are equal. If they are not, the string is not a palindrome and the algorithm correctly determines this (2 points). If they are equal, then the algorithm recursively checks if the

substring of length n-2 < n formed from the original string excluding the first and the last character is a palindrome. By the induction hypothesis, the algorithm works correctly for this case. Hence the algorithm works for any n ≥ 0 (2 points).

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offen_018 **DLBIADPS01-01_exercise-question_OQ_hard/Übungsklausur_2**

Give a technical description of the software project to convert an XML document by inserting element within an existing file. Include the parts of the software and their functions.

The project needs to contain a parser which loads the XML source (3 points).

The parser needs to provide an API to capture the XML document (3 points).

The application needs to receive this capture and output it verbatim (2 points), but when the software detects that the elements must be inserted, it also outputs the inserted documents (2 points).