Review2 - Results

Question 1 **0 / 2 points**

In the worst case scenario, selection sort performs n swaps, where n is the number of elements in the input array.

- ○ True
- ➡ ○ False

Question 2 **0 / 2 points**

What is the maximum number of comparisons (worst case scenario) for an algorithm merging two sorted lists, each of length n?

- ○ n^2.
- ○ n.
- ○ $n-1$.
- ➡ ○ $2n-1$.

Question 3 **0 / 2 points**

There exists an algorithm that deletes the largest element in the sorted array of distinct real numbers and which running time efficiency is in O(1).

- ➡ ◯ True
- ◯ False

Question 4 **0 / 4 points**

Consider the following algorithm.

```
ALGORITHM ExchangeSort(A[0..n-1])
//Sorts a given array by exchange sort
//Input: An array A[0..n-1] of orderable elements
//Output: Array A[0..n-1] sorted in nondecreasing order
for i<-0 to n-2 do
    for j<-i+1 to n-1 do
        if A[i]>A[j] swap A[i] and A[j]
```

Which type of input requires the minimal number of swaps to sort using the Exchange Sort algorithm?

- ➡ ✖ ☐ an array with only one element
- ➡ ✖ ☐ a strictly increasing array
- ✔ ☐ a strictly decreasing array
- ➡ ✖ ☐ an array with all equal elements

Question 5 **0 / 2 points**

Which permutation follows 532641 in lexicographic order?

- ➡ ◯ 534126
- ◯ 531246
- ◯ 534621
- ◯ 532146

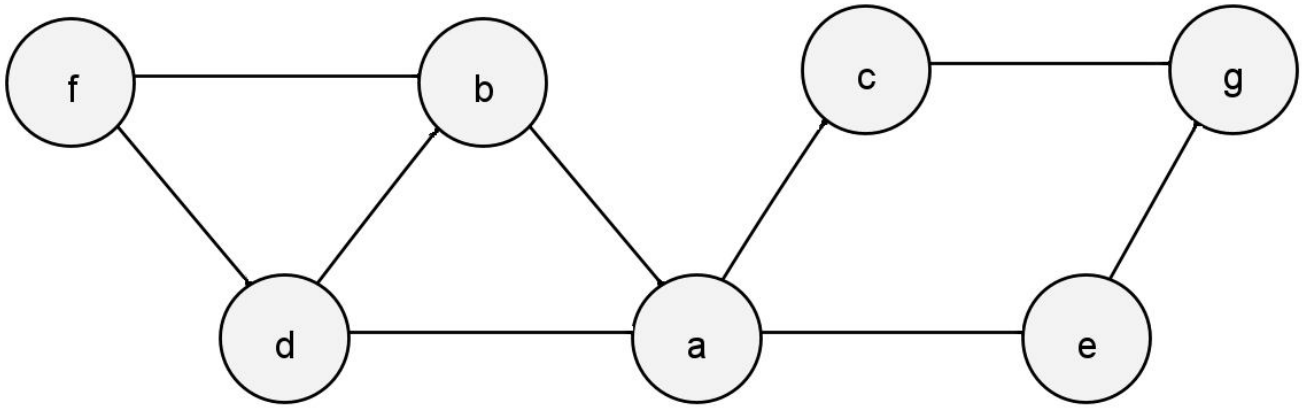
Question 6 **0 / 2 points**

There are no extreme points of a convex hull of a straight line.

- ➡ ◯ True
- ◯ False

Question 7 **0 / 3 points**

Starting at vertex a and resolving ties by the vertex alphabetical order, traverse the graph by breadth-first search. Choose the order in which the vertices were reached for the first time (added to the traversal queue).



- ◯ gfedcba
- ◯ gfedcba
- ◯ abdfcge
- ➡ ◯ abcdefg

Question 8 **0 / 3 points**

Which summation formula expresses the maximal number of assignment operations that take place in lines (*) in the below algorithm?

```
ALGORITHM InsertSort(A[0..n-1])
for i<-1 to n-1 do
    v<-A[i] (*)
    j<-i-1
    while j>=0 and A[j]>A[j+1] do
```

```
        A[j+1]<-A[j] (*)
        j<-j-1
    A[j+1]<-v (*)
```

- $\sum_{i=1}^{n-1}\left(1+\sum_{j=0}^{i-1}1\right)+1$
- $\sum_{i=1}^{n-1}\left(2+\sum_{j=0}^{i-1}1\right)$
- $\sum_{i=1}^{n-1}\left(1+\sum_{j=0}^{i-1}1\right)$
- $\sum_{i=1}^{n-1}\sum_{j=0}^{i-1}3$

Question 9 **0 / 2 points**

The adjacency list for an undirected graph treats each edge as if it were two directed edges in opposite directions. Thus, the edge between **a** and **b** appears as edges from **a** to **b** and from **b** to **a**.

- True
- False

Question 10 **0 / 2 points**

The best-case input for the Insertion Sort is an array already sorted in nondecreasing order.

- True

False

Question 11 **0 / 2 points**

There are no mobile elements is the below permutation.

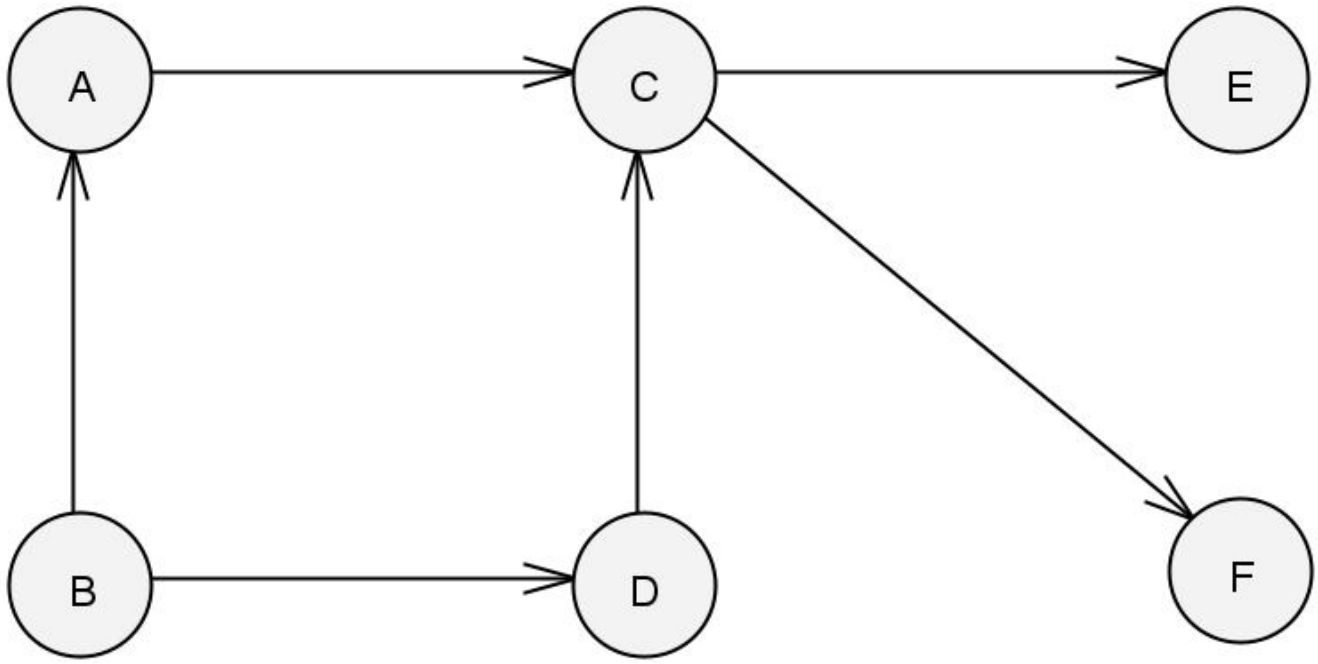
$\overleftarrow{6}\ \overleftarrow{5}\ \overleftarrow{4}\ \overrightarrow{3}\ \overrightarrow{2}\ \overrightarrow{1}$

True

➡ False

Question 12 **0 / 4 points**

Apply the source-removal algorithm to solve the topological sorting problem for the following graph. Whenever you have a choice of vertices to explore, always pick the one that is alphabetically first.



FECDAB

ABDCEF

➡ BADCEF

EFCADB

Question 13 **0 / 2 points**

The order of growth of the following two functions of n is the same, where $n > 1$.

$$C(n) = \log_2(n) + 1$$

$$M(n) = 5\log_3(n) + 2$$

- ◯ True
- ◯ False

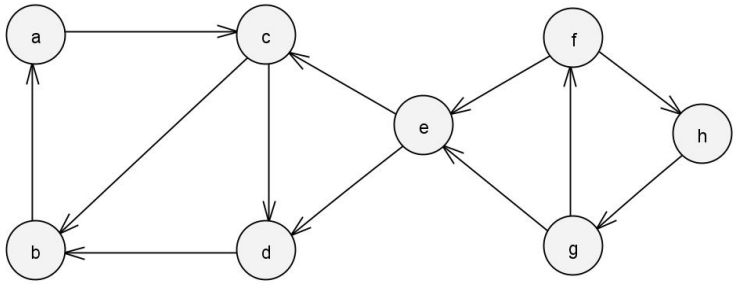
Question 14 **0 / 2 points**

If the subgraph of an undirected graph on n - 1 vertices is not connected, it does not imply that the original graph on n vertices is not connected.

- ◯ True
- ◯ False

Question 15 **0 / 2 points**

The below graph is a dag.



- ◯ True
- ◯ False

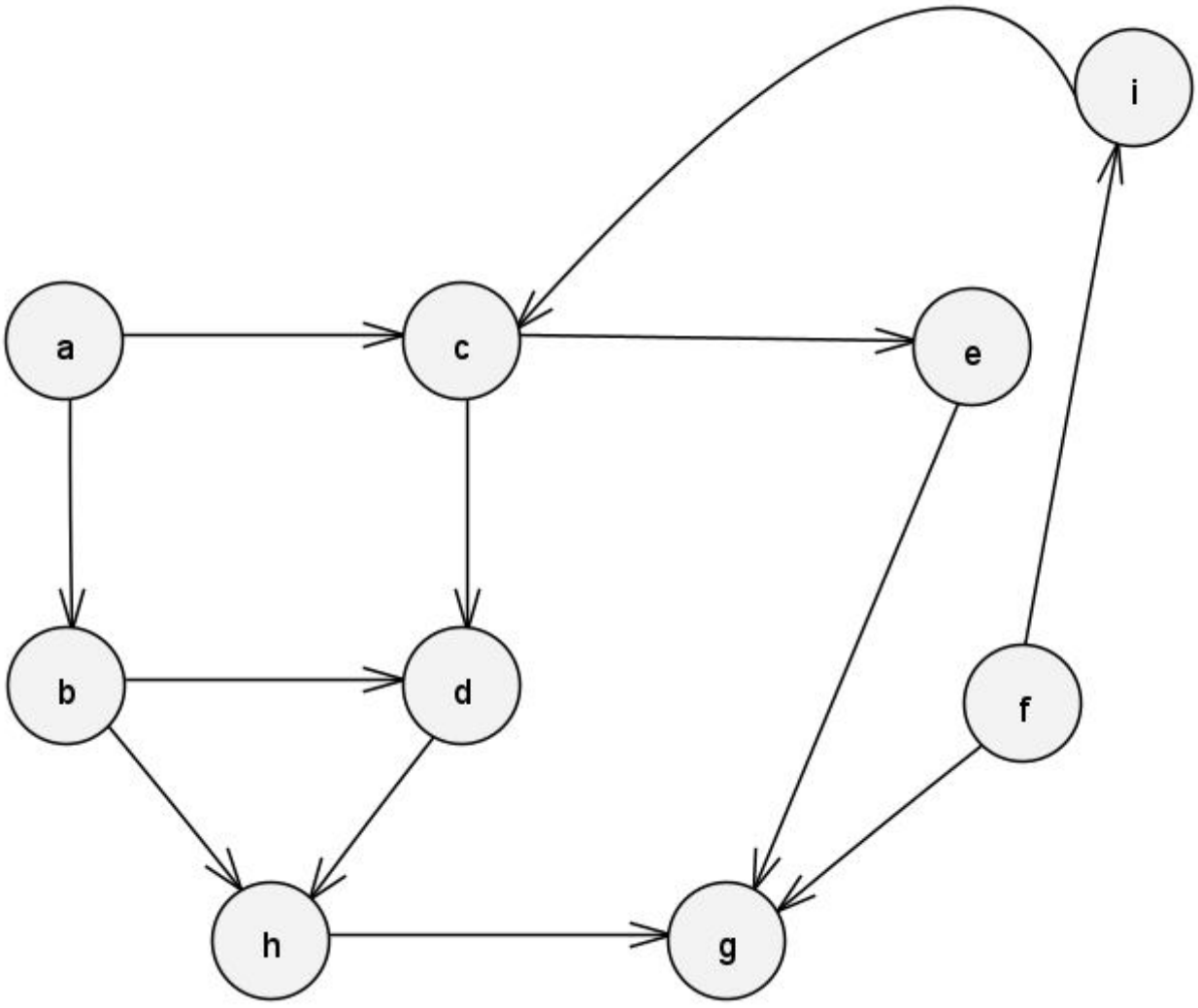
Question 16 **0 / 2 points**

The presence of which edges, if any, in a DFS forest indicate that the digraph has a directed cycle?

- cross edge
- back edge
- forward edge
- tree edge

Question 17 **0 / 4 points**

Apply the DFS-based algorithm to solve the topological sorting problem for the following graph. Whenever you have a choice of vertices to explore, always pick the one that is alphabetically first.



- fiacebdhg
- ghdbecaif

- abficdehg
- abcdhegfi

Question 18 **0 / 2 points**

The Johnson-Trotter algorithm can be used to solve the Knapsack Problem.

- True
- ➡ False

Question 19 **0 / 2 points**

Exhaustive search is a brute-force approach to combinatorial problems.

- ➡ True
- False

Question 20 **0 / 2 points**

For the adjacency matrix representation the DFS traversal time is in $\Theta\left(n^2\right)$, where **n** is the number of vertices in the graph.

- ➡ True
- False