國立中山大學112學年度
碩士班暨碩士在職專班招生考試試題

科目名稱：計算機概論【資管系碩士班甲組、乙組】

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答(不得另攜帶紙張，亦不得使用應考證空白處作為計算紙使用)。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學112學年度碩士班暨碩士在職專班招生考試試題

科目名稱：計算機概論【資管系碩士班甲組、乙組】　　題號：442001

※本科目依簡章規定「不可以」使用計算機(選擇題)　　

第1~20題為單選題，每題3分，第21~30題為複選題，每題四分（選項全對才給分）。

1. A network switch uses a _____ that is very similar to a routing table used in a router.
   A. hash table
   B. forwarding table
   C. contingency table
   D. reversing table

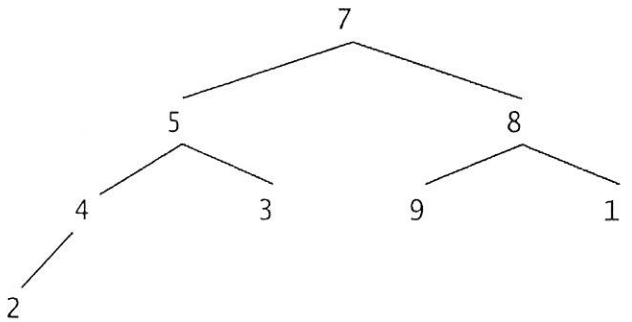
2. Encryption is the process of
   A. transmission of information over secure lines to prevent illegal access.
   B. detecting errors in messages by using mathematical rules.
   C. preventing errors in messages by using logical rules.
   D. disguising information by using mathematical rules.

3. Public blockchains usually use _____ as the consensus mechanism to validate transactions.
   A. proof of concept
   B. proof of payment
   C. proof of reserve
   D. proof of work

4. What does NFT stand for?
   A. Non-functional token.
   B. Non-fungible token.
   C. New frequency technology.
   D. Nano-finance technology.

5. In the UML, the top compartment of the rectangle modeling a class contains:
   A. The class's name.
   B. The class's attributes.
   C. The class's behaviors.
   D. All of the above.

6. Which of the following is the inorder traversal of the binary search tree?



   A. 24359187.
   B. 75423891.
   C. 24537981.
   D. None of the above.

7. What is the subnet number of the IP address 10.0.17.130 with the subnet mask 255.255.255.192?
   A. 10.0.0.0
   B. 10.0.17.0
   C. 10.0.17.128
   D. 10.0.17.192

8. When a client code programmer uses a class whose implementation is in a separate file from its interface, that implementation code is merged with the client's code during the
   A. programming phase.
   B. compiling phase.
   C. linking phase.
   D. executing phase.

9. TCP/IP relies on the _____ to decide to which application a message should be delivered.
   A. MAC address
   B. SSID
   C. IP address
   D. port number

10. _____ is used to perform IP address to data link address resolution.
   A. ARP
   B. DNS
   C. HTTP
   D. NAT

11. Which one of the following statements about system calls is wrong?
   A. System calls are an interface for accessing computer resources.
   B. System calls can only be executed under kernel mode.
   C. The dual mode is to protect systems from malware attacks.
   D. All input or output functions in a program must get through system calls.

12. Which one of the following statements about databases is wrong?
   A. All relational databases use the same query language to access databases.
   B. In relational databases, every table is indexed by a key.
   C. SQL is not used for accessing NoSQL databases.
   D. NoSQL databases use key-value to access data. Therefore, a table can be indexed by the key.

13. Which one of the following statements about the Internet of Things (IoT) is wrong?
   A. An IoT device refers to an object that has network access.
   B. IoT devices can be accessed through WLAN, but not WAN.
   C. Bluetooth earphones are IoT devices.
   D. If an IoT device connects to the internet, it might be compromised by attackers.

14. Assume that there is a three-frame physical memory in the system. Initially, all frames are empty. Given the reference string: abcdbafbacbac. How many page faults are generated if LRU is used?
   A. 6
   B. 7
   C. 8
   D. 9

15. There is a fake coin in a pile of N coins, whereas a fake one has a lighter weight. There are two possible ways to identify the fake coin: sequential search or divide-and-conquer. Which one of the following statements is wrong?
   A. The time complexity of the divide-and-conquer is O(logN).
   B. The time complexity of the sequential search is O(N).
   C. The best case of sequential search takes 1 comparison.
   D. The best case of divide-and-conquer takes 1 comparison.

16. Which one of the following statements is wrong?
   A. Users use the client-server model to access web servers.
   B. Users can be attacked by web browsing.
   C. In the client-server model, a client makes a request and the server sends back the response, so a web server cannot be attacked by a web user.
   D. The username/password is a common user authentication mechanism for users to access a web server.

17. One's complement (1's complement) and two's complement (2's complement) are used to represent signed integers. Which one of the following statements is wrong?
   A. Given a k-bit register, the range of signed integers that can be represented by 2's complement is between $-(2^{(k-1)}-1)$ and $(2^{(k-1)}-1)$.
   B. In 2's complement, 110010 represents -14.
   C. To get 2's complement of a binary number, invert the given number and add 1 to the least significant bit (LSB) of the given result.
   D. In 1's complement, 1111 represents 0, while in 2's complement, 1111 represents -1.

18. Many applications such as banking services use relational database management systems (RDMS) to process user data, RDMS fulfill the ACID properties. Which one of the following statements about relational databases is wrong?
   A. Atomicity property guarantees that each transaction is treated as a single operation.
   B. Entity-Relation models contain two major elements: entity and relationship.
   C. RDMS use locks to ensure that at any time only one user changes the data.
   D. Consistency property ensures that the data is in a consistent state all the time.

19. Which one of the following statements about cloud computing is wrong?
   A. There are three types of cloud computing: IaaS, PaaS, and SaaS.
   B. IaaS mainly provides virtual machines with the given hardware specs you need.
   C. Cloud computing is a type of distributed computing that requires high-speed networks.
   D. Cloud computing is often used for big data analysis so that a large amount of data can be stored and processed in a single machine.

20. A piece of code below declares a doubly linked list. Assuming that the node curNode is not the head or the last node of the list, which one of the following pieces of code is to delete the node curNode?

```
struct node
{
   struct node *prev;
   int data;
   struct node *next;
}
```

```
struct node *head;
```

A.
```
curNode->prev->next = curNode->next;
curNode->next->prev = curNode->prev;
```
B.
```
curNode->prev->next = curNode->prev;
curNode->next->prev = curNode->next;
```
C.
```
curNode->next->next = curNode->next;
curNode->prev->prev = curNode->prev;
```
D.
```
curNode->next = curNode->prev->next;
curNode->prev = curNode->next->prev;
```

21. (複選) Which one(s) of the following is(are) supervised learning?
A. Support vector machine.
B. Naïve Bayes classifier.
C. K-nearest neighbors.
D. Convolutional neural networks.
E. K-means clustering.

22. (複選) Which one(s) of the following processor families is(are) based on ARM architecture?
A. AMD Ryzen.
B. Apple Silicon.
C. Qualcomm Snapdragon.
D. Samsung Exynos.
E. Nvidia Tegra.

23. (複選) Which one(s) of the following is(are) based on a convolutional neural network?
A. WordNet.
B. ResNet.
C. Inception.
D. ImageNet.
E. GoogLeNet.

24. (複選) Which one(s) of the following programming languages is(are) executed by an interpreter?
A. Python
B. Matlab
C. C
D. R
E. Assembly

25. (複選) Which one(s) of the following mechanisms has(have) been utilized to achieve differential privacy?
   A. Linear mechanism.
   B. Laplace mechanism.
   C. Exponential mechanism.
   D. Gaussian mechanism.
   E. Triangular mechanism.

26. (複選) Which one(s) of the following statements is(are) correct?
   A. By using virtualization technologies, a physical machine can become multiple machines of different operating systems.
   B. Virtualization can make programs run faster.
   C. Virtualization technologies can virtualize RAM and CPU, but not network.
   D. Virtualization can protect machines from system crashes.

27. (複選) Which one(s) of the following statements about algorithms is/are correct?
   A. A flowchart is a way of presenting an algorithm.
   B. An algorithm is used to describe a problem solution.
   C. Algorithms can be only used for computer programming.
   D. Pseudocode describes more precisely than a flowchart.

28. (複選) Given a directed weighted graph G(V, E), where there are N vertices and M edges in graph G. The graph is represented by an adjacent matrix. Which one(s) of the following statements is/are correct?
   A. A greedy algorithm can find an optimal path of a single source to a single destination.
   B. It takes the time complexity of $O(N^3)$ to find optimal paths of all sources to all destinations.
   C. A greedy algorithm can find optimal paths of a single source to all destinations.
   D. A solution for a single source to all destinations must be a tree structure.

29. (複選) Which one(s) of the following statements about sorting is/are correct?
   A. Quick sort is a divide-and-conquer algorithm, so its worst-case time complexity is O(nlogn).
   B. Merge sort takes less time complexity, O(nlogn), than insertion sort and as much space as insertion sort.
   C. A binary search tree allows fast lookup, but the time complexity of a search on a binary search tree depends on the tree structure.
   D. Insertion sort is a steady sort.

30. (複選) Assume that a data record requires D bytes, an integer takes 2 bytes, and a pointer takes 4 bytes. Let N be the expected maximum number of data records and n be the actual number of data records stored in a queue during the data processing. There are two ways of implementing a queue: array and linked list. Which one(s) of the following statements is/are correct?
   A. Array implementation takes DxN+4 bytes.
   B. Linked list implementation takes up 4N+4 more bytes than array implementation when storing N data records.
   C. If n=N/2 and a data record stores two integers, array implementation takes less space.
   D. If N is not provided, linked list implementation is more flexible.

國立中山大學112學年度
碩士班暨碩士在職專班招生考試試題

科目名稱：管理資訊系統【資管系碩士班甲組】

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答(不得另攜帶紙張，亦不得使用應考證空白處作為計算紙使用)。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學112學年度碩士班暨碩士在職專班招生考試試題

科目名稱：管理資訊系統【資管系碩士班甲組】　　題號：442003

※本科目依簡章規定「不可以」使用計算機(問答申論題)　　

1.資訊人員的重要職責之一為確保資訊系統的成功實施，(30%)

(1)請舉出一個資訊系統實施成功模式(IS Success Model)，並說明之 (10%)。

(2)資訊系統的實施可能會遇到障礙，請列出 5 個資訊系統的實施失敗的主要障礙因素 (10%)。

(3)另外，使用者為保護自己的安全與利益，很可能會對資訊系統採取抗拒的行為，請列出 5 個影響使用者抗拒資訊系統的主要因素 (10%)。

2.電子商務發展的趨勢之一為虛實整合、線上線下(O2O)的整合，進而形成所謂的全通路經營模式(Omni-Channel)，(20%)

(1)何謂全通路經營模式(Omni-Channel)？(10%)

(2) 請舉一個現有廠商案例說明全通路如何運作 (10%)。

3. 人工智慧在組織的應用日益廣泛，請就以下問題回答。(25%)

(1)何謂人工智慧？請定義之！(5%)

(2)人工智慧可以如何支援企業運作？請舉例說明之。(10%)

(3)RPA 是常見的 AI 應用之一，請舉兩個例子例說明 RPA 應用場景(10%)

4.元宇宙是近來新興的議題，請就以下問題回答。(25%)

(1)何謂元宇宙？請定義之！(5%)

(2)元宇宙可能使用到的科技有哪些？(5%)

(3)請舉例說明元宇宙可能的應用有哪些？(5%)

(4)請說明元宇宙可能面臨的挑戰有哪些？(10%)

國立中山大學112學年度
碩士班暨碩士在職專班招生考試試題

科目名稱：資料結構【資管系碩士班乙組】

－作答注意事項－

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，請衡酌作答(不得另攜帶紙張，亦不得使用應考證空白處作為計算紙使用)。
- 答案卡請以2B鉛筆劃記，不可使用修正液（帶）塗改，未使用2B鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學112學年度碩士班暨碩士在職專班招生考試試題

科目名稱：資料結構【資管系碩士班乙組】　　題號：442002

※本科目依簡章規定「不可以」使用計算機(選擇題)　　

單選題(每題 2.5 分)

1. What is the output of the following C program?

```
float array[5];
print("%d", sizeof(array));
```

A. 5
B. 10
C. 20
D. 40

2. Consider that we are implementing linked list in C with C Structures.
We have defined a non-empty list with an integer value named "data" and a C pointer to a node named "link". Assume nPtr is a C pointer to the new node and lPtr is a pointer to the last node of the list. Which of the following is the code in the function that adds a node to the end of the linked list?

A. lPtr = nPtr; nPtr->link = lPtr;
B. lPtr = nPtr; lPtr-> link = nPtr;
C. nPtr->link = lPtr; lPtr = nPtr;
D. lPtr -> link = nPtr; lPtr = nPtr;

3. Which of the following is NOT a common operation defined on associative arrays?
A. Push: to add a new value to the top of the collection.
B. Lookup: to find the value (if any) bound to a given key.
C. Re-assign: bind an old key to a new value.
D. Delete: to remove a pair of data from the collection.

4. Which of the following is NOT considered a characteristic of a good hash function?
A. able to avoid collisions
B. able to spread keys evenly
C. able to generate different values given the same input
D. is fast and easy to compute

5. Which of the following about AVL tree is FALSE?
A. It is a kind of binary search tree.
B. The heights of the children of every internal node can differ by at most 2.
C. It rebalances itself through tree rotation operations.
D. Its search and traversal operations are similar to a binary search tree.

6. Which of the following is NOT a common variant of quicksort?
   A. Shell quicksort
   B. External quicksort
   C. Quick radix sort
   D. Three-way radix quicksort

7. Which of the following is NOT an algorithm used to solve the shortest path problem?
   A. Dijkstra's algorithm
   B. Forward–backward algorithm
   C. Floyd–Warshall algorithm
   D. Viterbi algorithm

8. Which of the following about array and linked list is FALSE?
   A. Arrays are dense and static data structure.
   B. Arrays are usually more efficient to access than linked lists.
   C. Typical linked lists are collections of the nodes that contain an information part and a link to next node.
   D. The data in the linked list must be stored in contiguous space in memory.

9. Which of the following about hash tables and tries is FALSE?
   A. Tries are ordered prefix trees used to store strings.
   B. Tries are usually faster on average at insertion than full hash tables.
   C. Tries perform faster than hash tables when tries are used to store many long strings.
   D. Tries usually require less memory than hash tables because they do not need additional memory to store the hash indexation table.

10. Which of the following data structures is NOT commonly used for graph representation?
    A. Adjacency list
    B. Adjacency matrix
    C. Incidence list
    D. Confusion matrix

11. Which of the following definitions of graphs is TRUE?
    A. A bipartite graph is a graph in which vertices can be divided into two disjoint and independent sets U and V such that every edge connects a vertex in U to one in V.
    B. A sparse graph is a graph in which the number of edges is close to the maximum number of edges.
    C. A dual graph is a graph in which every pair of vertices in the graph is connected.
    D. A circular graph is a directed graph that consists of multiple cycles.

12. Which of the following statements about iteration and recursion is FALSE?
    A. Recursion breaks down a problem into smaller and solvable parts, then combines/aggregates the results.
    B. Using recursion consumes less resources necessary to execute equivalent function call.
    C. Both iteration and recursion can occur infinitely.
    D. Iteration is usually faster than an equivalent recursion.

13. Which of the following about algorithms is FALSE?
    A. Greedy algorithms are able to find local optimal solutions.
    B. Brute-force algorithms are guaranteed to find the best solution.
    C. Backtracking algorithms are commonly used to solve constraint satisfaction problems.
    D. Hill climbing will eventually converge on a global maximum.

14. Which of the following about merge sort is FALSE?
    A. To sort a data array in ascending order, it selects the smallest element from the unsorted array at each iteration and places that element at the beginning of the array.
    B. It is a divide-and-conquer algorithm.
    C. It is considered a stable sort.
    D. Its worst case complexity is O(n log n).

15. Which of the following data structures is better suited to help store information about the active subroutines of a program?
    A. Stack
    B. Queue
    C. Linked list
    D. Tree

16. What is the worst case time complexity of the binary search algorithm?
    A. O(1)
    B. O(log n)
    C. O(n)
    D. O(n^2)

17. Let's say we have a 2000-element balanced binary search tree, what is the maximum number of comparisons that may be needed to find an element in the tree?
    A. 8
    B. 11
    C. 20
    D. 2000

18. Suppose we have a graph with 10 vertices, if we represent the graph with an adjacency matrix, what is the number of elements/cells?
    A. 10
    B. 30
    C. 100
    D. 1024

19. What does the following C function do for a given character array "str"?

```
void fun1(char str[ ] ) {
  char c = str[0];
  if(c != '\0') fun1(++str);

  printf("%c",c);
}
```

    A. Print the array.
    B. Print the array in reverse order.
    C. Reverse and update the array.
    D. Reverse without updating the array.

20. Which computational complexity represents an algorithm that runs the fastest in the worst-case scenario?
    A. O(n)
    B. O(n2)
    C. O(log(n))
    D. O(nlog(n))

21. What is the postfix expression for (5+3)*7+1*5 ?
    A. 53+*71*5+
    B. +*+537*15
    C. 53715+**+
    D. 53+7*15*+

22. After the following operations on a stack, what will the remaining data be in the data structure? push("A"), push("C"), push("B"), pop(), push("F"), pop(), push("K"), push("J"), pop()
    A. FKJ
    B. ACK
    C. JKF
    D. ACBFKJ

23. Which data structure has the longest worst-case insertion time?
    A. Stack
    B. Queue
    C. Binary heap
    D. Singly linked list

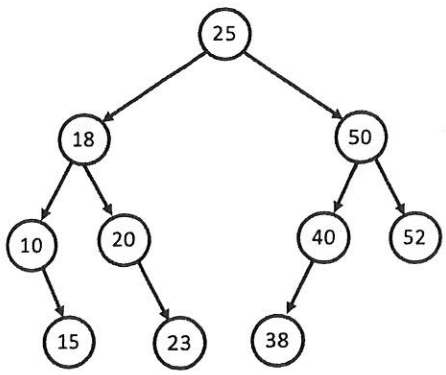
24. What is the time complexity of the following C code?

```
int total = 0;
for(int i = 1; i <= n; i = i * 2){
   total += i;
}
```

    A. O(n)
    B. O(log(n))
    C. O(n2)
    D. O(1)

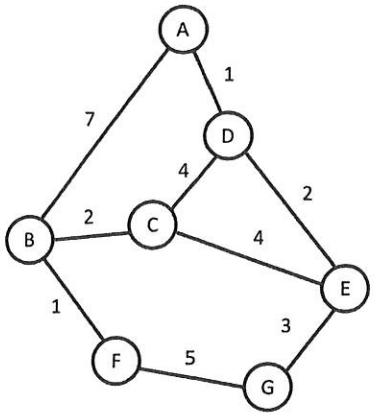
25. For a binary search tree whose pre-order traversal is 5 3 1 2 10 9 7 12 and in-order traversal is 1 2 3 5 7 9 10 12, what would be its post-order traversal?
    A. 12 7 9 10 2 1 3 5
    B. 2 1 3 7 9 12 10 5
    C. 12 10 9 7 5 3 2 1
    D. 12 5 7 9 3 2 1 10

26. After inserting 12 next into the binary search tree below, what would be the resulting tree's pre-order traversal?



    A. 25 18 10 15 12 20 23 50 40 38 52
    B. 25 18 12 10 15 20 23 50 40 38 52
    C. 10 12 15 18 20 23 25 38 40 50 52
    D. 10 15 12 23 20 18 38 40 52 50 25

27. Using Kruskal's algorithm on the following graph, which edge is the 5th edge that will be added to the minimal spanning tree?

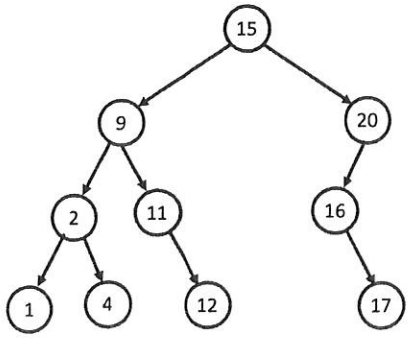


A. DE
B. AD
C. FG
D. EG

28. What is the answer to the prefix expression **"+5+*79-8*2/93**"? (numbers are in single digits)
A. 83
B. 394
C. 60
D. 70

29. A binary search tree is generated in order with the following numbers:
1, 4, 5, 10, 11, 3, 2, 8, 12. What is its root?
A. 1
B. 5
C. 12
D. 10

30. For the following tree, what is the 7th node we visit if we perform an in-order traversal?



A. 1
B. 15
C. 12
D. 20

31. Which is the best order of insertion of a binary search tree that has the shortest worse case search time?
    A. 1, 2, 3, 4, 5, 6, 7
    B. 1, 7, 2, 6, 3, 5, 4
    C. 5, 6, 4, 7, 3, 2, 1
    D. 4, 2, 6, 1, 3, 5, 7

32. Which of the following array implements a min heap?
    A. [1,2,3,4,5,6,7,8,9,10]
    B. [10,9,8,7,6,5,4,3,2,1]
    C. [1,3,5,7,9,2,4,6,8,10]
    D. [5,6,4,7,3,8,2,9,1,10]

33. Which adjacency matrix represents an undirected graph with 2 connected components?
    A.

	1	2	3	4
1	0	1	0	0
2	1	0	0	1
3	0	0	0	1
4	0	1	1	0

    B.

	1	2	3	4
1	0	1	1	1
2	1	0	0	0
3	1	0	0	0
4	1	0	0	0

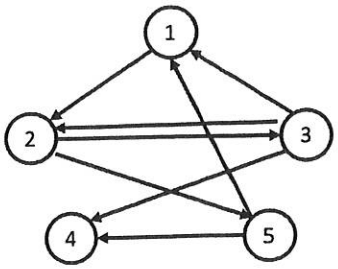
    C.

	1	2	3	4
1	0	0	0	1
2	0	0	1	0
3	0	1	0	0
4	1	0	0	0

    D.

	1	2	3	4
1	0	1	0	0
2	1	0	1	1
3	0	1	0	0
4	0	1	0	0

34. What is the correct adjacency list representation for the following directed graph?



A.

1	->	3	5	
2	->	1	3	
3	->	2		
4	->	3	5	
5	->			

B.

1	->	2	3	5
2	->	1	3	5
3	->	1	2	4
4	->	3	5	
5	->	1	2	4

C.

1	->	2		
2	->	3	5	
3	->	1	2	4
4	->			
5	->	1	4	

D.

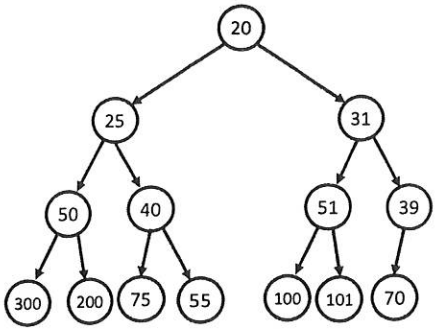
1	->	2	3	
2	->	1	3	5
3	->	1	2	
4	->	3	5	
5	->	1	2	

35. Which algorithm is the slowest for sorting [1,2,3…,100000] from small to large?
A. Quicksort
B. Insertion Sort
C. Selection Sort
D. Merge Sort

36. For sorting from small to large with insertion sort, with [1,3,6,10,7,50,5], what are the two numbers that need to be swapped during the second exchange?
A. 3, 6
B. 7, 10
C. 6, 7
D. 5, 50

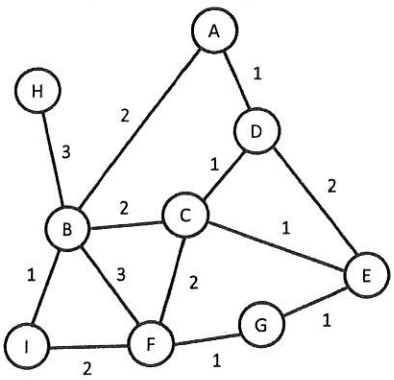
37. What is a "stable" sorting algorithm?
    A. the algorithm has the same performance on inputs of different sizes
    B. the algorithm keeps the original order of items when the items are equal
    C. the algorithm performs the same no matter how it is implemented
    D. the algorithm does not move items more than one slot away in each round

38. In the following min heap, if we remove the minimal item 5 times, what would the two nodes with height 1 after the removals?



    A. 25, 31
    B. 50, 51
    C. 55, 51
    D. 75, 70

39. How many minimal spanning trees are in the following undirected graph?



    A. 2
    B. 3
    C. 4
    D. 5

40. What is the minimal number of nodes in an AVL tree with a height of 10?
    A. 1023
    B. 1024
    C. 10
    D. 9