一、選擇題（單選）35 題，每題 2 分，共 70 分，請在每題的選項內選擇最適當的答案。
注意： 答錯倒扣 1 分，扣至零分為止。(不答不倒扣)
請在【答案卡】內依序作答，否則不予以計分。

1. Which of the following is not correct about IP?

   (A) IPv4 uses a 32-bit address (B) IPv6 uses a 96-bit address (C) 255.255.0.0 is a valid IP address (D) 127.0.0.0 is reserved for loopback (E) all of the above are correct.

2. Which of the following is wrong in the OSI (Open Systems Interconnection) model?

   (A) layer 1 is physical (B) layer 3 is network (C) layer 5 is session (D) layer 7 is application (E) all of the above are correct.

3. Which of the following is not correct about SQL?

   (A) "DELETE TABLE mytable" deletes the entire table of "mytable"

   (B) "SELECT * FROM mytable" returns all the data from "mytable"

   (C) "CREATE TABLE mytable (name_1 char(10), name_2 char(10))" creates a table named "mytable" with two columns of type char of fixed length

   (D) "ORDER BY col_name ASC" clause orders column "col_name" in ascending order

   (E) all of the above are correct.

4. Which of the following is not correct about HTTP?

   (A) Its default port is 80 (B) HTTPS provides authentication of the web site and associated web server that one is communicating with (C) HTTP is a stateless protocol (D) HTTP is an application layer protocol (E) all of the above are correct.

5. Which of the following is not correct about protocol?

   (A) TCP/IP is the standard protocol for the Internet (B) SMTP is an Internet standard protocol for email transmission (C) POP (Post Office Protocol) is an Internet standard protocol for e-mail clients to retrieve e-mail from a server (D) SSH is a standard protocol for exchanging files over the Internet (E) all of the above are correct.

6. Which of the following is not correct about relational database?

   (A) the primary key of a table uniquely identifies each record in the table (B) a foreign key is a field in a relational table that matches the primary key column of another table (C) a relation is usually described as a table (D) a table is organized into rows and columns (E) all of the above are correct.

7. Which of the following operations in relational database is for combining fields from two relations by using values common to each other?

   (A) join (B) cross product (C) different (D) union (E) none of the above.

8. A markup language created to structure, store, and transport data by defining a set of rules for encoding documents in a format that is both human-readable and machine-readable.

   (A) HTML (B) XML (C) script (D) PHP (E) SQL.

9. Although there is no formal definition, some features may be used to distinguish between Web 2.0 and Web 1.0. Which of the following is not such a feature?

   (A) user participation (B) user collaboration (C) community (D) information display (E) web as a platform.

10. A collaboration software that allows its users to add, modify, or delete its content via a web browser:

    (A) RSS (B) wikipedia (C) wiki (D) Content Aggregator (E) blog.

11. The use of tags to annotate and categorize contents by general users results in a system of classification known as

    (A) Ontology (B) Tag clouds (C) Taxonomy (D) Folksonomy (E) none of the above.

12. A type of licensing that allows copyright owners to release some of those rights while retaining others, with the goal of increasing access to and sharing of intellectual property:

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(A) Public Domains (B) Shareware (C) Creative Commons (D) Open source (E) Creative Right.

13. Which of the following best categorizes Twitter's service?

(A) instant messaging (B) news feeds (C) online chat (D) social networking (E) microblogging.

14. Which of the following servers translates a domain name into its associated IP address?

(A) DNS (B) Web (C) HTTP (D) Gateway (E) router.

15. Currently, the system clock of a desktop computer runs in the range of

(A) 2-10 MHz (B) 500MHz-1GHz (C) 2-10 GHz (D) 20-50GHz (E) 50-100GHz.

16. A scanner is typically equipped with the following software to convert a scanned document to a text file:

(A) pattern recognition (B) image recognition (C) magnetic ink character recognition (D) optical character recognition (E) optical mark recognition.

17. A system for managing the sales of retail goods, including cashier and inventory management:

(A) Point-of-Sales (B) electronic transfer (C) electronic cashier (D) Point-of-Retailing (E) Point-of-Cashier.

18. Which of the following is not a value of mobile computing?

(A) ubiquity (B) instant connectivity (C) customization (D) localization (E) all of the above are values of mobile computing.

19. Which of the following is not a popular application area of RFID?

(A) logistic (B) ETC (C) package tracking (D) health care (E) automobile license plate recognition.

20. A test of a machine's ability to exhibit intelligent behavior, equivalent to or indistinguishable from, that of an actual human.

(A) Artificial Intelligence (B) Machine Learning (C) Human-Computer Interface (D) Turing Test (E) Truth Table.

21. An artificial intelligence computer system developed by IBM and demonstrated on a TV program "Jeopardy" to show its capability of answering questions posed in natural language:

(A) Watson (B) Deep Blue (C) Blue Gene (D) Thinking Machine (E) Cray.

22. Apple's speech interpretation and recognition interface for intelligent personal assistant and knowledge navigator in its iOS systems:

(A) Voice Search (B) S Voice (C) Siri (D) MacSpeech (E) none of the above.

23. Which of the following universities initiated the OpenCourseWare project in 2002 to put all of the educational materials from its undergraduate- and graduate-level courses online, partly free and openly available to anyone:

(A) Stanford (B) UC Berkeley (C) MIT (D) Harvard (E) Chicago Univ.

24. Which of the following processors controls the manipulation and display of graphics on a display device?

(A) CPU (B) GPU (C) RISC (D) CISC (E) ARM.

25. A server connected to a network with the sole purpose of providing storage:

(A) RAID (B) network attached storage (C) storage area network (D) disk array (E) external hard disk.

26. A data storage device that uses integrated circuit assemblies as memory to store data persistently like a regular disk driver, and has capacity of hundreds of Gigabytes:

(A) solid state drive (B) CMOS (C) flash memory array (D) microSDHC (E) memory module.

27. Which of the following is not correct?

(A) a CD-ROM has storage capacity about 650MB (B) a one-side, one-layer DVD-ROM has storage capacity about 4.7GB (C) a one-side, two-layer DVD-ROM has storage capacity about 8.5GB (D) a Blu-ray can have storage capacity of 25GB or 50GB (E) all of the above are correct.

28. Which of the following is not correct?

(A) Microsoft's latest operating system is Windows 7 (B) Linux is a family of Unix operating systems (C) OS X Mountain Lion is Mac's operating system (D) Symbian is an embedded operating system (E) all of

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the above are correct.

29. A utility designed to increase access speed by rearranging files stored on a disk to occupy contiguous storage:

(A) disk diagnosis (B) disk hasher (C) disk scanner (D) disk defragmenter (E) disk mapper.

30. Which of the following best categorizes MD5?

(A) a symmetric encryption scheme (B) an asymmetric encryption scheme (C) a hash function (D) an error correction scheme (E) an error detection scheme.

31. Which of the following data structures is most effective for implementing a depth-first search on a graph?

(A) Queue (B) Stack (C) Hash Table (D) Heap (E) Binary Tree

32. A heap can be efficiently implemented as an array A with the root stored in A[1] and the left and the right children of A[i] stored respectively in A[2i] and A[2i+1]. Assuming the heap is a *min* heap, which of the following listings of the array elements (from A[1] to A[5]) cannot possibly be a stable state of the heap?

(A) 0,1,2,4,3 (B) 0,1,3,2,4 (C) 0,2,1,4,3 (D) 0,3,1,2,4 (E) 0,1,4,3,2

33. An algorithm is analyzed to be at most $O(n^3)$-time. Which of the following functions cannot possibly be the actual running time of the algorithm?

(A) $n \log n$ (B) $2^{\log n}$ (C) $1.5n^{1.5}$ (D) $3n^3$ (E) $3.4n^{3.4}$

34. Which of the following statements about (undirected) graphs and trees is correct?

(A) Every graph has a spanning tree.

(B) A graph with n vertices and $n-1$ edges must be a tree.

(C) A tree is a connected graph without cycles.

(D) A tree with n vertices may have more than $n-1$ edges.

(E) A connected subgraph of a graph G without cycles is a spanning tree of G.

35. A graph is _____ if, after the removal of any vertex, the graph remains connected. Please choose a term that is most accurate.

(A) connected (B) biconnected (C) regularly connected (D) tightly connected (E) strongly connected.

二、問答題 2 題，每題 15 分，共 30 分。
請在【答案卷】內依序作答，否則不予以計分。

1. Design an algorithm that, given two sets of numbers, computes the union of the two sets. The first set of m numbers is given as an array A in no particular order and the second set of n numbers as another array B also in no particular order. The result should be represented as a third array C where no particular ordering is required. It is known that m is much larger than n, approximately in the order of n^2. Please describe your algorithm in suitable pseudo code and analyze its time complexity. The more efficient your algorithm is, the more points you will be credited for this problem.

2. Identify the known relationships among the four complexity classes: P, NP, NP-hard, and NP-complete. Describe a problem that is NP-hard but not known to be in P. Describe another problem that is in P but not known to be NP-hard.

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