注意：1.本試題共 3 頁，請依序作答，並標明題號，不必抄題。
　　　2.答案必須寫在答案卷上之指定作答區內，否則依規定予以扣分。

一、選擇題（單一答案、不倒扣）：每題 4 分

1. Which of the following would not be considered hardware?

    (a) an operating system

    (b) a CPU

    (c) a keyboard

    (d) a hard drive

2. If a program is made to share the resources of the computer with other programs, this is known as

    _____.

    (a) batch processing

    (b) multi-programming

    (c) cloud computing

    (d) object-oriented programming

3. A computer can directly understand only its own _____.

    (a) machine language

    (b) assembly language

    (c) high-level language

    (d) none of the above

4. Given an array of N integers that <u>have not been sorted</u>. Finding a certain number from the array typically takes tme that is proportional to:

    (a) $\sqrt{N}$

    (b) $\log_2 N$

    (c) N

    (d) N^2

5. Given an array of N integers <u>that are sorted in ascending order</u>. Finding a certain number from the array typically takes tme that is proportional to:

    (a) $\sqrt{N}$

    (b) $\log_2 N$

    (c) N

    (d) N^2

6. Which of the following is NOT a network protocol for emails?

    (a) IMAP

    (b) POP3

    (c) SMTP

    (d) GSM

7. Consider the function represented by pseudo-code at right. What is the value of Func(5)?

```
Func(integer n)
{
    integer x;
    x := Func( n-1 );
    x := n * x;
```

    (a) 5

    (b) 15

    (c) 120

    (d) The function never finishes its computation

8. Which of the following may be strongly linked to Moore's Law?

    (a) The world population doubles approximately every 50 years.

    (b) The number of transistors on an computer chip doubles approximately every two years.

    (c) The number of web sites doubles approximately every two years.

    (d) The number of mobile phone doubles approximately every two years.

9. Using the open source code of UNIX, a Finnish college student called Lnus Torvalds developed the _____ operaing system in 1991.

    (a) Mac OS

    (b) X Window

    (c) Linux

    (d) Android

10. If the memory addresses of a computer are binary numbers of 32 bits, then the maximum size of the memory is most likely to be _____ bytes.

    (a) 10^{32}

    (b) 2^{32}

    (c) 32^{2}

    (d) 32^{10}

二、簡答題: 每題 6 分

11. Rank the speed of the following three wireless LAN standards, from the fastest to the slowest:

    802.11a

    802.11b

    802.11n

12. Rank the speed of the following three types of computer memory, from the fastest to the slowest:

RAM

Flash memory

CPU registers

13. Please list the following four technology, from the earliest to the latest, according to the time they appeared:

integrated circuit (IC)

transistor (電晶體)

vacuum tube (真空管)

microprocessor

14. Please list the following four technology, from the earliest to the latest, according to the time they appeared:

cloud computing

internet

BBS

World Wide Web (WWW)

15. Given two binary numbers A = 01101001 and B = 11110011, please compute their bitwise operations: (a) A AND B.   (b) A XOR B

16. (a) Please convert the hexadecimal (十六進位) number 7F to its decimal (十進位) number.

(b) Please convert the hexadecimal (十六進位) number 7FFF to its decimal (十進位) number.

17. Please show the binary number representation of -7 (in decimal) using two's complement (二補數) of 8 bits.

18. Please write the postfix form of the following infix expression:

(A – B) * (A + C / D)

19. Can the real number 0.1 be precisely represented as a floating-point number? Please explain why or why not.

20. Please show the pseudo-code (or any high-level programming language of your choice) to compute the sum of all integers from 1 ato 100.