

Grading: 4 points for each problem.

1. Represent "-20" using 8 bits in 2's complement form.
2. What is the range of integers that an 8 bit pattern in 1's complement form can represent?
3. How many bits are needed to address single byte of memory for a 32MB computer?
4. Among the three mechanisms to transfer data between I/O devices and memory: 1) Programmed I/O, 2) I/O interrupt, and 3) DMA, which way usually costs more hardware resources to implement? Which way usually has better performance?
5. Describe the network's seven layers by OSI standard.
6. Explain what a "machine cycle" is.
7. Explain what "multiprogramming" is.
8. Among the different system software units, explain what an "assembler" is.
9. What are the two major components of a Von Neumann machine, and what are their functions?
10. In an imperative language, what construct is used to model memory cells?
11. Which programming language(s) below use "variable"?
 - (1) imperative language
 - (2) functional language
 - (3) logic language
 - (4) object-oriented language
12. What two methods are used to translate high level programs into machine ones?
13. Why is readability important for a programming language?
14. What are (1) static binding and (2) dynamic binding, respectively?
15. In open hashing, with the quotient-offset collision handler, insert the following keys into a table of size 11: 33, 22, 26, 48, 19. Show the resulting table.
16. Insert the following elements to an empty min-heap:

49, 26, 202, 140, 9, 300 Show the result.
17. For the following code segment, estimate worstTime(n) using Big-O notation. In the segment, S represents a sequence of statements in which there are no n-dependent loops.


```
for (int i = 0; i * i < n; i++)
  for (int j = 0; j < n; j++) S
```
18. Convert the base-2 number 101001.101 into a base-10 number.
19. What is the value of the expression below in prefix notation?

$$+ / * + 1 2 3 - 8 5 2$$
20. What is DRAM? What is SRAM?
21. Give four primitive data types of a programming language.

注意：背面有試題

22. What is the roundoff (rounding) error?
23. What is the parity check?
24. What is the "stack" data structure?
25. What is the execution result (the result printed in the console screen) of the following C/C++ code?

```
#include <stdio.h>
void test() {
    static int i=0;
    printf("%d",i++);
}
main() {
    for (int j=8;j < 13;j++) test();
}
```