

1. Draw a possible organization for the runtime environment of the following C program. 15%
- (a) After entry into block A in function f.
(b) After entry into block B in function g.

```
int a[10];
char * s = "hello";
int f(int I, int b[]);
{
    int j = I;
    A: { int I = j;
        char c = b(I);
        ....
    }
    return 0;
}
```

```
void g(char * s)
{
    char c = s[0];
    B: { int a[5];
        ...
    }
}
```

```
main()
{
    int x = 1;
    x = f(x, a);
    g(s);
    return 0;
}
```

2. Please describe what is the language generated by the regular expression: 5%

$(aa \mid b)^* (bb \mid a)^*$

3. Please describe the following items used in compiler systems: 15%
- (a) Deterministic Finite Automaton
(b) Attribute Grammar
(c) Syntax Directed Definition

(背面仍有題目,請繼續作答)

4. Show that the following grammar is LR(1) but not LALR(1): 15%

$$\begin{aligned} S &\rightarrow aAd \mid bBd \mid aBe \mid bAe \\ A &\rightarrow c \\ B &\rightarrow c \end{aligned}$$

5. A thread is usually called a *lightweight process (LWP)* while the traditional process is called the *heavyweight process*. Explain why the term "light" is used for thread compared with the "heavy" for the traditional process. 10%
6. The caching mechanism is very important in today's information processing. Write down the corresponding caching device, storage, or system for the following items. (a)RAM, (b)page table, (c)paging system, (d)WWW. 15%
7. How many page faults will occur using optimal page-replacement and LRU algorithms respectively for the following reference string: (You know, the number refers to a page) 10%

1 0 7 1 0 2 1 2 3 0 3 2 4 0 3 0 2 1 0 7

8. Determine the following *true* or *false* and briefly explain your answer. 15%
(No credits are given without explanation)
- In the dual-mode system, all the statements in a user's program are run in the user mode.
 - The CPU utilization is proportional to the degree of multiprogramming.
 - The virtual machine induces more overheads to the whole system so that it will decrease the system utilization.
 - Transactions are allowed to overlap their execution while maintaining serializability.