系所組別：電腦與通信工程研究所甲組
考試科目：計算機組織與作業系統　　　　　　　　　　　　考試日期：0222，節次：1

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Select the most appropriate answers for the following multiple choice questions. Each question may have more than one answer. 10 point each, no partial point, no penalty.

1. The widespread adoption of precise exception support in CPUs was that it enabled support for demand paging in virtual memory systems: to overlap processor execution with the long latency of paging I/O, the state of a faulting process could be cleanly saved away and another process restored in its place.
Which of the following statements is (are) true? 10%
a. A page fault needs precise exception support for the restoration of the faulting process.
b. Demand paging means requesting the missing page only if an attempt is made to access it.
c. "the state of a faulting process could be cleanly saved away and another process restored in its place," this is context switching.
d. The operation of moving the missing page is done by the CPU.

2. Which of the following is (are) true? 10%
a. For a fixed size cache memory, the smaller the line size is the smaller the spatial locality the cache has.
b. For a fixed size cache memory, the larger the line size is the smaller the temporal locality the cache has.
c. For a direct-mapped cache, no address tag is the same in the tag memory.
d. For a fully set associative cache, no address tag is the same in the tag memory.

3. Coding and ISA problem.
a. Write a C code for the execution of a 九九乘法表.　　10%.
b. Convert the above C code into MIPS or ARM assembly or to RISC-like instructions. 10%
c. Transform the above assembly code into a subroutine code.　　10%

4.
(a) Please describe how the fork() system call in the UNIX operating system is used to create a new process in a single-threaded program.　5%
(b) After a fork() system call, the child process may invoke or may not invoke the exec() system call. Please describe how these two cases work.　5%
(c)Please describe how the semantics of the fork() and exec() system calls in the UNIX operating system change in a multithreaded program.　5%

5.
(a) What is the readers-writers problem.　5%
(b) Discuss the tradeoff between fairness and throughput of operations in the readers-writers problem.　5%
(c) Propose a method for solving the readers-writers problem without causing starvation.　5%

(背面仍有題目,請繼續作答)

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6. There are several memory-management algorithms: contiguous allocation, paging, segmentation, and combination of paging and segmentation. They differ in many aspects. Please compare the different memory-management strategies using the following considerations: hardware support, performance, fragmentation, relocation, swapping, sharing and protection.　　20%

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