

國立交通大學試題紙

科目：作業系統 A

日期：101 年 1 月 17 日 第 1 頁 共 1 頁

請“✓”明 ✓不可看書 可看書

* 請將答案依題號順序寫入答案卷

答題時字跡需工整，否則不予計分。Write your answers legibly; otherwise you will get zero score.

1. [8pts] Does LRU page replacement algorithm always yield the minimum number of page faults for any memory reference string? If yes, please prove LRU's optimality. If not, please give a counterexample.
2. *Shared memory* and *pipe* are two classic IPC mechanisms. They both are still widely used on today's operating systems. Please explain why we need two mechanisms for IPC by :
 - (a). [9pts] Giving a scenario where *shared memory* will be the better choice for IPC
 - (b). [9pts] Giving a scenario where *pipe* will be the better choice for IPC
3. Please answer the following questions regarding *priority inversion* :
 - (a). [6pts] Explain what is priority inversion
 - (b). [6pts] Briefly discuss the strength and weakness of *disabling interrupts* for priority inversion avoidance
 - (c). [6pts] Briefly discuss the strength and weakness of using *priority inheritance* for priority inversion avoidance
 - (d). [6pts] Briefly discuss the strength and weakness of using *priority ceiling* for priority inversion avoidance

◎請用深黑色鋼筆或原子筆出題

命題老師簽名：

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1. Please answer the following questions regarding *process synchronization*:

- (a). [15pts] Why are synchronization mechanisms required in an operating system kernel? Why are synchronization mechanisms required in a multi-core platform?
- (b). [15pts] Please explain the differences between *atomic operations*, *spinlock* (busy waiting), and *semaphores* (sleep waiting). Also, explain when and why do we use different mechanisms in an operating system kernel.

2. Please answer the following questions regarding *I/O subsystems*:

- (a). [5pts] What are *blocking I/O* and *non-blocking I/O*?
- (b). [5pts] What are differences between *non-blocking I/O* and *asynchronous system call*?
- (c). [10pts] Please draw and explain the life cycle (step by step procedures in the kernel) of a blocking I/O. Please use file I/O call, `read()`, as an example.

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