1. (10%) Consider a computer that does not have a TEST AND SET LOCK instruction but does have an instruction to swap the contents of a register and a memory word in a single indivisible action. Can that be used to write a routine enter region such as the one found in Fig. 2–12.

Ans : 可以

ENTER\_REGION:

MOVE REGISTER, #1

SWAP REGISTER, MEMORYWORD(LOCK)

CMP REGISTER, #0

JNE ENTER\_REGION

RET

1. (20%) Measurements of a certain system have shown that the average process runs for a time T before blocking on I/O. A process switch requires a time S, which is effectively wasted (overhead). For round robin scheduling with quantum Q, give a formula for the CPU efficiency (i.e., the useful CPU time divided by the total CPU time) for each of the following:

,If S is small compared to T, then utilization is almost 100%.



,same as (a).











1. (10%) Consider the interprocess-communication scheme where mailboxes are used. Suppose a process P wants to wait for two messages, one from mailbox A and one from mailbox B. What sequence of send and receive should it execute so that the messages can be received in any order?

建立2個threads，分別去receive mailbox A及mailbox B的send，透過此方法則可以同時進行。

1. (10%) Consider the following program that uses the Pthreads API. What would be the output of the program? (Note that the line numbers are for references only.)

A = 1

B = 1

C = 2

D = 2

由於fork()後是交由scheduler進行排程，所以順序不一定，共有4!種可能。