科目：**作 業 系 統** (Operating System)　　　第一頁　共二頁（page 1 of 2）

1.　(20 %) Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 134, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 3774, 948, 4509, 1022, 2750, 130. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for SSTF and SCAN disk scheduling algorithms?

2. (20 %) Are the following statements true or false? For each statement, you will get 4 points for correct answer, zero point for blank, or -2 point for incorrect answer.

   (a) 127.0.0.1 is a loopback address in IPv4.

   (b) FF:FF:FF:FF:FF:FF is a broadcast address in Ethernet networks.
   (c) Domain Name Service (DNS) can be used to acquire IP addresses.
   (d) Address Resolution Protocol (ARP) can be used to acquire IP addresses.
   (e) Network Address Translation (NAT) is used to map MAC addresses to IP addresses.

3. (10 %) Suppose a thread is running in a critical section of code. It means that the thread has acquired all the locks through proper arbitration. Can this thread get context switched? Please explain the reasons.

4. (10%) The shortest-job-first scheduling algorithm has a notable weakness. What is it? How do you solve this problem?

5. (10%) Consider the following Resource Allocation Graph. Is it deadlocked? Why?
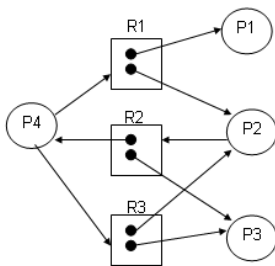
6. (10%) Consider the following snapshot of a system. Is it in a safe state? Why?

	Allocation A B C D	Max A B C D	Available A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

7. (20%) Given the reference string "4 6 2 3 4 6 3 1 4 1 6 2 5 4 1"and frame size of 3, please answer the following questions:

● Use the round-robin algorithm to demonstrate page replacement and page faults.

● Use the optimal algorithm to demonstrate page replacement and page faults.