Computer Operating Systems

Problem #1

Consider three process, all arriving at time zero, with total execution time of 10, 20 and 40 units respectively. Each process spends the first 20% of execution time doing I/O, the next 65% of time doing computation, and the last 15% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. What percentage of CPU time/utilization remains idle?

Problem #2

Let m[0]…m[4] be mutexes (binary semaphores) and P[0]…P[4] be processes. Suppose each process P[i] executes the following:

```
wait(m[i]);
wait(m[(i+1) mod 4]);
…….
release(m[i]);
release(m[(i+1) mod 4]);
```

Will this cause a deadlock? Please explain your answer.

Problem #3

Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB. These partitions need to be allocated to four processes of sizes 357 KB, 210 KB, 468 KB and 491 KB in that order. Perform the allocation of processes using-

- First Fit Algorithm
- Best Fit Algorithm
- Worst Fit Algorithm