Sheet3
Uniprocessor Scheduling

1) Briefly describe the three types of processor scheduling.
2) What is usually the critical performance requirement in an interactive operating system?
3) What is the difference between turnaround time and response time?
4) For process scheduling, does a low-priority value represent a low priority or a high priority?
5) What is the difference between preemptive and nonpreemptive scheduling?
6) Briefly define FCFS scheduling.
7) Briefly define round-robin scheduling.
8) Briefly define shortest-process-next scheduling.
9) Briefly define shortest-remaining-time scheduling.
10) Briefly define highest-response-ratio-next scheduling.
11) Briefly define feedback scheduling.
12) Consider the following set of processes:

Process	Arrival Time	Processing Time
A	0	1
B	1	9
C	2	1
D	3	9

For each of the following scheduling methods, give (1) a timing chart to illustrate the execution sequence, (2) service time, (3) finish time, (4) turnaround time, (5) normalized turnaround time and (6) waiting time.

a) FCFS
b) RR, q = 1
c) RR, q = 4
d) SPN
e) SRT
f) HRRN

13) Most round-robin schedulers use a fixed size quantum. Give an argument in favor of a small quantum. Now give an argument in favor of a large quantum. Compare and contrast the types of systems and jobs to which the arguments apply. Are there any for which both are reasonable?
14) Five batch jobs, A through E, arrive at a computer center at essentially the same time. They have an estimated running time of 15, 9, 3, 6, and 12 minutes, respectively. Their (externally defined) priorities are 6, 3, 7, 9, and 4 respectively, with a lower value corresponding to a higher priority. For each of the following scheduling algorithms, determine the turnaround time for each process and the average turnaround for all jobs. Ignore process switching overhead. Explain how you arrived at your answers. In the last three cases, assume that only one job at a time runs until it finishes and that all jobs are completely processor bound.

a) round robin with a time quantum of 1 minute
b) priority scheduling
c) FCFS (run in order 15, 9, 3, 6, and 12)
d) shortest job first

15) Consider the following three processes. Each process makes a CPU burst then an I/O burst, another CPU burst, another I/O burst and terminates with a CPU burst. The lengths of the CPU burst and I/O burst times in milliseconds are given in the following table:

Process	CPU-Burst 1	I/O-Burst 1	CPU-Burst 2	I/O-Burst 2	CPU-Burst	Arrival Time
P1	2	4	2	2	2	0
P2	2	2	3	3	1	1
P3	1	2	1	1	1	1

The processes are assumed to arrive as indicated. Draw three time diagrams that illustrate the execution of these processes using

a) The first come first served (FCFS) algorithm
b) The round robin (RR) scheduling algorithm with quantum = 1 and
c) The round robin (RR) scheduling algorithm with quantum = 2.

If an I/O completion and a CPU timeout of two processes occur at the same time, we treat the I/O completion first. Add three lines to the Gantt chart that represent the ready queue.

d) What is the waiting time of each process for of the above scheduling algorithms? What is the mean value?
e) What is the turn-around time of each process for each of the above scheduling algorithms? What is the mean value?
f) What happens if we assign a priority to each process? The priority of P2 is higher than the priority of P1 and P3. Consider the situations of RR, where quantum=1 and quantum=3. Do not consider FCFS (Why not?).

How to submit the homework assignments?

- Solve the sheet individually without looking up the solution on the Internet. The sheet is to practice; it is a learning tool not an exam.
- Assignments are to be **handwritten**.
- Papers are to be scanned (I like camscanner app). Put all images in a pdf file (camscanner does that for you)
- Use MS Teams to submit
    - Your filename should be your user id
