CSSE 332 – Operating Systems
Rose-Hulman Institute of Technology
Computer Science and Software Engineering Department

Scheduling Policies

Name:_____ Box:_____

Problem 1 (16 points out of 24 total) Fill in the Gantt charts (8 points), using the given scheduling policy and the table below. Calculate the average turnaround time and average response time for each algorithm (2 points each). If a new process is admitted at the same time that an existing process is preempted, the new process enters the ready queue first.

Note: processes are always enqueued at the tail of the ready queue and dequeued from the head of the queue.

Process	Arrival Time	Service Time
A	0	3
B	2	6
C	4	4
D	6	5
E	8	2

	Time																			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
First-in, first-out (FIFO)	A	A	A	B	B	B	B	B	B											
Round robin, quantum = 4 (RR, q=4)																				
Round robin, quantum = 1 (RR, q=1)																				
Shortest job first (SJF)																				

(a) FIFO

i. Average turnaround time

ii. Average response time

(b) RR, q=4

i. Average turnaround time

ii. Average response time

(c) RR, q=1

i. Average turnaround time

ii. Average response time

(d) SJF

i. Average turnaround time

ii. Average response time

Problem 2 (8 points) Now we will do the same thing for a multilevel feedback queue. Imagine a 3 level feedback queue as described in your book in section 6.3.6. The quantum for each queue is 1. All processes begin from the highest priority queue, i.e., queue 1.

The behaviour of the processes is described below:

- Process **A** starts at *t = 0*. The CPU workload is **10** time slots, and there is no IO operation.
- Process **B** starts at *t = 1*. The CPU workload is **2** time slots.
- Process **C** starts at *t = 3*. The CPU workload is **20** time slots. Everytime **C** runs for **0.5** time slot it issues an I/O request (assume here that I/Os each take **0.5** time slot.)

In this case, rather than do a GANTT chart, we ask you to 1) specify what process(s) CPU is running during a particular quantum; 2) plot the snapshoots of the queue states (i.e., what process is at which queue) at these moments: $\mathbf{t = 1}$, $\mathbf{t = 2}$, $\mathbf{t = 3}$ and $\mathbf{t = 5}$:

For example, for $\mathbf{t = 0}$:
Queue 1: **A**
Queue 2:
Queue 3:
CPU is running Process **A** during this quantum.

(a) $\mathbf{t = 1}$

(b) $\mathbf{t = 2}$

(c) $\mathbf{t = 3}$

(d) $\mathbf{t = 5}$