**Assignment 3**

**CIS355** – Spring Term 2018

**Point Value**: 100 points

**Assignment Due Date**: **In class Tuesday, March 1, 2018**

**Submission Instruction**

Please write your answers to those questions on a Microsoft Word document. The name of the file should be HW3\_YourLastname\_YourFirstname.docx. Please submit the file .docx on Schoology by 11:59pm and a hard copy of the file to the instructor in class on the due date.

**Short answers**

1. **Please answer the following questions given the following scenario.**

**\*\*\*ON PAPER\*\*\***

**Assume that the three processes arrived in order:**

**Processes CPU Burst Time**

P1 17

P2 6

P3 8

1. Please draw the Gantt chart if FCFS scheduling is used. **(5 points)**
2. Please calculate the average waiting time and average completion time under FCFS. You MUST show the calculation procedure. **(5 points)**
3. Please draw the Gantt chart if Round Robin is used. **(5 points)**
4. Please calculate the average waiting time and completion time under RR with q = 3. You MUST show the calculation procedure**. (5 points)**
5. Between the two CPU scheduling strategies, which one is better? Why? **(5 points)**
6. **Please answer the following questions given the following scenario.**

**\*\*\*ON PAPER\*\*\***

Assume that the three processes arrived in order at time 0:

**Processes CPU Burst Time**

P1 10

P2 5

P3 7

P4 3

1. If Shortest-Job-First is used, please draw the Gantt chart. **(5 points)**

**\*\*\*ON PAPER\*\*\***

1. Please calculate the average waiting time and average completion time under SJF**. (5 points)**

**\*\*\*ON PAPER\*\*\***

1. **Please answer the following questions given the following scenario.**

**\*\*\*ON PAPER\*\*\***

Assume that the three processes arrived at different time:

**Processes Arrival Time CPU Burst Time**

P1 0 16

P2 2 8

P3 3 7

P4 4 4

1. If the Shortest-Remaining-Time-First scheduling is used, please draw the Gantt chart. **(10 points)**

**\*\*\* ON PAPER\*\*\***

1. Please calculate the average waiting time and the average turnaround time **(10 points) \*\*\* ON PAPER\*\*\***
2. Please describe what is Multi-level Feedback Queue scheduling? **(10 points)?**

* **Multi-level Feedback Queue Scheduling allows a process to move between queues. Each queue has its own scheduling algorithm and adjusts each job’s priority depending on priority-level, and the method used to determine which queue a process will enter when that process needs a service.**

1. Please describe what is lottery scheduling? **(10 points)**

* **Processes are scheduled in a random manner. Every process has some tickets and scheduler picks a random ticket. The process having that ticket is the winner and it is executed for a time slice; and then another ticket is picked by the scheduler. These tickets represent the share of processes. A process having a higher number of tickets give it more chance to get chosen for execution.**

1. Please explain which one of the following CPU scheduling strategies have the optimal/best average response time? **(5 points)**
   1. **FCFS**
   2. **RR**
   3. **SRJF**
   4. **Priority**
   5. **Lottery**

**C.) Tasks with I/O bound (not very CPU intensive) will tend to have shorter CPU burst times. For example, when typing on notepad the CPU use time is minimal as most of the tasks time is spent blocking key strokes. Therefore we want I/O related tasks to complete their CPU bursts as quickly as possible and be able to wait for further input from the user. In order to accomplish this, SRJF should be used.**

1. Please explain the following terminologies:
   1. **CPU Utilization – keep the CPU as busy as possible. It is a percentage (0-100%) (2 points)**
   2. **Turnaround time –(for one process): waiting to get into the memory and waiting in the ready queue and execution on CPU and doing I/O (2 points)**
   3. **Waiting time –total time the job is waiting in the ready queue (2 points)**
   4. **Response time (for one process): the period between the submission of a request and the first response. This is different from turnaround time. (2 points)**
   5. **Throughput –number of jobs completed per unit of time (per second) (2 points)**
2. Assuming zero-cost context-switching time, is RR always better than FCFS? Please explain your answer? (10 points)

* Both RR and FCFS finish at the same time
* Average response time is much worse under RR
* Bad when all jobs same length
* Also: Cache state must be shared between all jobs with RR but can be devoted to each job with FCFS
* Total time for RR is longer even for zero-cost switch
* **EXAMPLE:** 10 jobs, each takes 100s of CPU time  
   RR scheduler quantum of 1s  
   All jobs start at the same time

P1

P2

P9

P10

…

0

100

800

900

1000

200

FCFS

…

0

10

980

990

1000

20

…

…

…

…

999

991

RR