CSC 262 Operating Systems Course
Midterm #1
Due Date: Oct 14, Friday, until mid-night (Northampton local time)

Question 1 (20 pts)

Briefly answer below questions.

a. What is the role of CPU Scheduler
b. What is a Race Condition
c. What is Dispatcher Latency
d. What is Context Switch, when it happens?
e. What is PCB (Process Control Block)
f. What is Ready Queue, what is the use of it?
g. What are Registers in CPU, what are their roles?
h. What is a Cache Memory in general?
i. What are the differences between threads and processes?
j. What are the states of a process?

Question 2 (40pts)

Process	Burst Time	Priority
P_1	10	3
P_2	6	1
P_3	2	3
P_4	3	4
P_5	5	2

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5, all at time 0.

a. Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF (preemptive version of SJF or shortest job remaining first), a non-preemptive priority scheduler (a smaller priority number implies a higher priority), and RR (quantum = 2) scheduling.

b. what are the average response time, average waiting time, average turnaround time for each of the scheduler algorithms?

Question 3(40 pts)

Provide a synchronization solution for the below problem (you can write a full running code by process or threads in java or in c. Or, you can simply provide pseudo code.). Please indicate the problems you have found and the solutions you have provided briefly.

A Riddle: A wolf, a sheep, and a cabbage need to cross the river. How can you bring them cross one by one, without the sheep eating the cabbage, nor the wolf eating the sheep?

Above is the classical riddle. Now, consider how would you solve the problem if many wolves, sheep and cabbages are arriving at random times. You need to avoid (or at least minimize) the “eat” problem at the coast and at the boat. You can also consider wolf, sheep and cabbage as processes and furthermore you can also consider boat or coast as process (last 2 is not required but optional).