24/9/2020

CS 300- Operating Systems Test-1

1. Consider the cooperating processes A, B, and C, which are executing different code portions, which are accessing and updating some shared variables. Process A is executing the X operation (i.e., wait) on semaphores s1, s2 and s3; process B is executing the X operation on semaphores s2, s3 and s4; process C is executing the X operation on semaphores s3, s4, and s1 before entering the respective code portion. After completing the execution of its code portion, each process invokes the Y operation (i.e., signal) on its three semaphores. Consider all semaphores are binary semaphores initialized to one. Show a deadlock free order of invoking the X operations by the processes? Discuss your answer. **[08 Marks]**
2. Consider below code of 3 cooperative processes and 3 binary semaphores, which are initialized as S0 = 1, S1 = 0, S2 = 0. How many times will process P0 print '0'? Justify your answer. **[04 Marks]**

Process P0	Process P1	Process P2

while (true) {
wait (S0);
print '0';
release (S1);
release (S2);
}
	wait (S1);
	release (S0);
		wait (S2)
		release (S0);

3. Consider a non-preemptive scheduling algorithm and processes with their expected CPU bursts of 5, 18, 9 and 12 are in the ready queue. In which order these processes should run to minimize wait time? Discuss your answer. **[07 Marks]**
4. In a system, suppose three processes are arriving at time zero and their execution time is 10, 20 and 30 respectively. Consider each process is spending first 20% of execution time to do I/O, next 70% time to do computation, and last 10% time to do I/O again. A OS uses a shortest remaining time first scheduling algorithm and schedules a new process, if the running process gets blocked on I/O or the running process finishes its computation. All I/O operations can be overlapped as much as possible. Derive the percentage of time, a CPU will remain idle? **[06 Marks]**