CSE4300 Operating Systems (Spring 2018)

Midterm Exam 1

Student Name: _____

Student NetID: _____

Question	Score
1	
2	
3	
4	
5	
Total	

Question 1.1: What are the modern OS functionalities? (5 points)

Question 1.2: Why OS services require hardware support? Given one example OS service and the corresponding hardware support. (5 points)

Question 2.1: What are the differences among algorithm, program and process? (5 points)

Question 2.2: In the following process state diagram, please fill in the missing <u>process states</u> and <u>transitions</u>. (10 points)
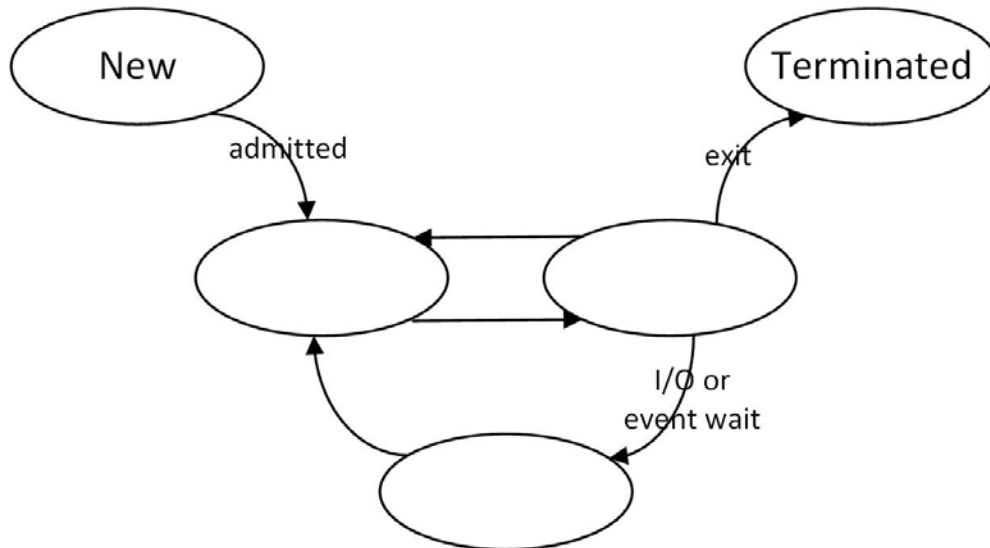
Question 2.3: How to create a process in Linux? What is the difference between the parent process and the created child process? (5 points)

Question 3: Calculate the completion time and wait time of the jobs in the following table for FCFS, RR (quantum = 1) and SRTF (shortest remaining time first). The scheduler can break ties arbitrarily. (25 points)

Job	Length	Arrival time	Completion time			Wait time		
			FCFS	RR	SRTF	FCFS	RR	SRTF
1	50	0						
2	40	5						
3	30	10						
4	20	15						

Question 4.1: Given a synchronous task set of three periodic tasks: T1 = (1, 6, 6), T2 = (2, 8, 8) and T3 = (4, 12, 12). Please construct the schedules for the task set from time 0 to time 24 under: (10 points)

(1) Rate-Monotonic Scheduling (RM)
(2) Earliest-Deadline-First Scheduling (EDF)

Question 4.2: Calculate the number of <u>context switches</u> in the above two constructed schedules. (5 points)

Question 4.3: Construct a task set of three periodic tasks so that it is schedulable under EDF but not RM, and its system utilization is less than 0.9. (10 points)

Question 5.1: What are the differences between Lock and Semaphore? (10 points)

Question 5.2: We discussed how to use semaphores to solve the reader-writer problem with the additional requirement that the reader and writer alternate to enter critical section. Please describe the key designs in the solution to ensure correction execution. (10 points)