CSE3502, Operating Systems
Fall 2019, Homework 1

1. What are the three themes of an operating system? Explain each of the function briefly. (5 point)

2. What are the differences of orphan processes and zombie processes? (5 point)

3. What are the differences between a monolithic kernel and a microkernel? (5 point)

4. What is system call used for? (5 point)

5. What is a process? What are the two essential parts of a process? How is a process different from a program? (5 point)

6. Given the five-state process model, explain how does a process transit among these states and on what events? (5 point)

7. What is the difference between interrupt and polling? What are the possible issues? List three different ways for inter process communication. (10 point)

8. What are the differences of threads and processes? (5 point)

9. Discuss the advantages and disadvantages of user-level threads and kernel-level threads. (15 point)

10. What are the commonalities and differences between semaphore and mutex? (5 point)

11. List different ways to avoid race conditions. (5 point)

12. What are the advantages and disadvantages of busy-waiting and sleep-and-wake approaches for mutual exclusion? (10 point)

13. Discuss the goals of CPU scheduling on different computer systems, e.g., batch systems, interactive systems and real-time systems. (5 point)

14. Assume that the following processes are to be executed on a uniprocessor system.
Based on their arrival time and CPU burst, calculate the average turnaround time and response time of these processes under the following scheduling policies: (15 point)
a. FCFS
b. Round Robin (quantum = 4 and 6)
c. Shortest Job First (preemptive and non-preemptive)

Process	Arrival Time	CPU burst
P1	0	12
P2	0	3
P3	2	7
P4	3	5

Compare the performance of above policies.