**Operating Systems**
Homework Assignment#1

**1.** If we click an icon of an application to start a process and then we click it again (assuming one click is enough to start a process):

- Do we generate two processes or one? Justify
- Will we have two entries in the process list of the OS? Or just one? Justify

**2.** Why does the OS need to give a process the illusion that it has the whole CPU for itself?

**3.** The OS is the only piece of software on your machine that can access the hardware. Why did the system designer decide on that restriction?

**4.** Multiprogramming is when the OS switches from one process to another in the same core quickly, so the user thinks that the processes are running in parallel. Now that we have multicore processors almost in all machines, do we still need this feature in the OS? Why?

**5.** In process state model, state one advantage and one disadvantage of having more states.

**6.** In the three-state model of a process (running, blocked, and ready), why there is no arrow from "Ready" to "Blocked"?

**7.** Let us define CPU efficiency as the time spent by the CPU doing useful computation divided by the total CPU time. Assume we have one CPU. So, it is useful CPU time divided by the total CPU time. Suppose we have a system where the OS makes context switch every Q seconds. If a process runs for T seconds, it blocks for I/O. The OS scheduler takes S seconds before the next process starts. These S seconds are considered wasted time. We have n processes of equal priority and the OS schedule them on a round-robin fashion. Give a formula for the CPU efficiency for each of the following:

a) Q = infinity b) S < Q < T c) Q > T
d) Q = T e) Q = S f) Q nearly 0