HOMEWORK 1

1. **What is the difference between an operating system and middleware?**
An operating system is software that uses the hardware of the computer to provide support for execution of the other software.
Middleware provides the services in the application programming interface, API by using the underlying features of the operating system.

2. **What is the relationship between threads and processes?**
A thread is the fundamental unit of concurrency. Any one sequence of programmed actions is a thread. Whereas, a process is a container that holds the thread or threads that were started running and protects them from unwanted interactions with other unrelated threads running on the same computer.

3. **Of all the topics previewed in chapter one of the textbook, which one are you most looking forward to learning more about? Why?**
Safety, because it is a versatile topic that is covered in every chapter. We are interested to see how they are going to address security with new threats on cyber security popping up presently every day.

4.

a.

Thread A takes total time of ->

100 * 10 = 1000 millisecond on processor + 100 for I/0 = 1100 millisecond

Thread B takes 1000 millisecond

Total : A + B = 2100 millisecond

b. Thread b -> 10 * 100 (completed)
+ (1) * 100 (switching)
Thread a -> 1 + 1 (switching) * 100
+ (1) * 100 (switching)

Total = 1300 millisecond

c . Process B is more efficient, because in process A when A is accessing processor not any

Useful work is done, whereas in process b that time is occupied by thread A and it becomes more efficient.

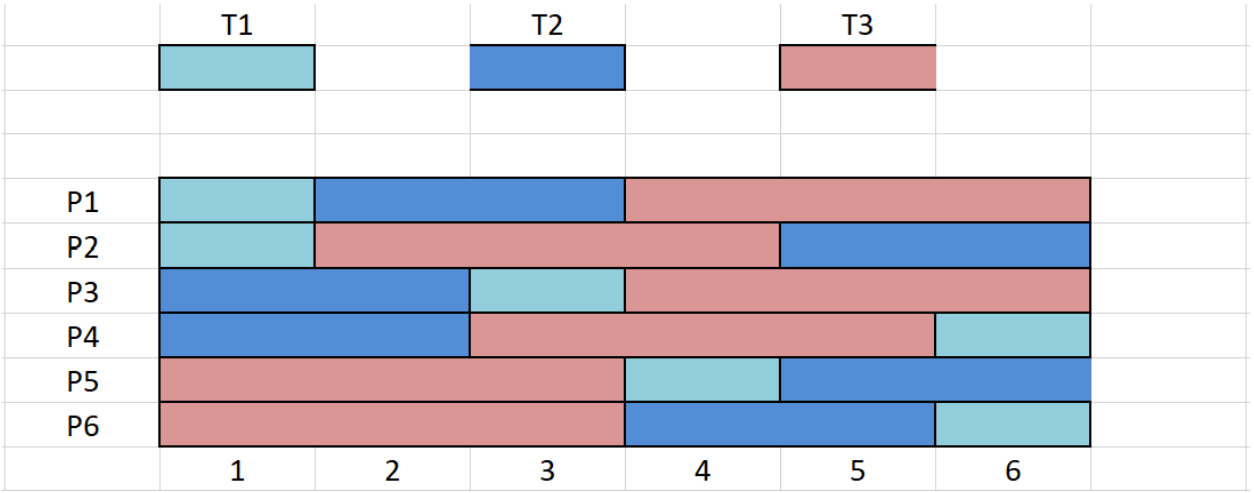
5. **Can the sleeping thread print its periodic messages while the main thread is waiting for keyboard input?**

Yes, the program can continue to print the message until the user hits the enter key.

Can the main thread read input, kill the sleeping thread, and print a message while the sleeping thread is in the early part of one of its five-second sleeps?

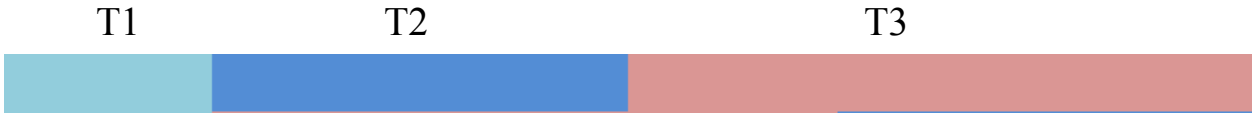
Yes, the program can cancel the thread before it prints out the first message.

6.



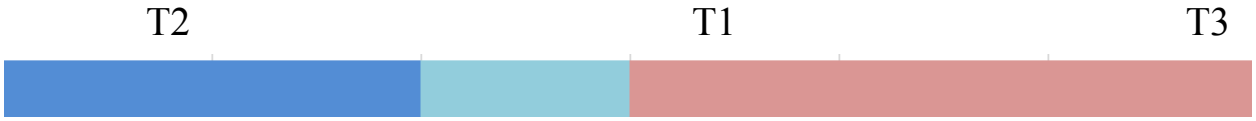
Turnaround Time = burst time + wait time

p1 . (1+0) + (2+1) + (3+3) = 10/3 = 3.33



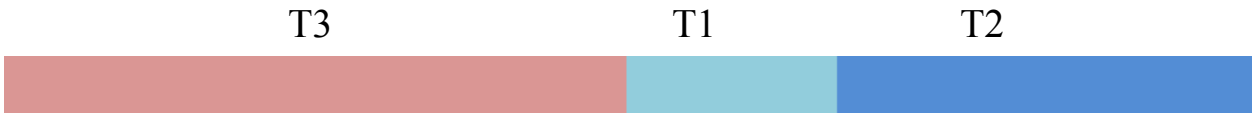
p2. (1+0) + (1+3) + (4+2) = 11/3 = 3.66

p3. (2+0)+(1+2)+(3+3) = 11/3 = 3.66

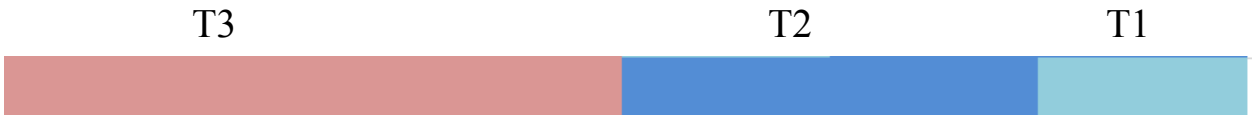


p4 . (2+0) + (2+3) + (5+1) = 13/3 = 4.33

p5. (3+0) + (1+3) + (4+2) = 13/3 = 4.33



p6. (3+0) + (2+3) + (5+1) = 14/3 = 4.66



Which order has the shortest average turnaround time? What is the name of the scheduling policy that produces this order?

1. p1 has the shortest with an average turnaround time of 3.33.
2. Fixed priority scheduling rate metabolic assignments.