Queues – Simulation

In this exercice, we're going to use queues in order to simulate scheduling in a doctor's waiting room (the same could be applied to the scheduling of processes in an operating system, or any other type of scheduling). For that purpose, we model patients in the following manner :

Patient	Arrival Time	Examination Time	Blood Tests
P1	3	10	4/5
P2	0	6	5/1
P3	2	8	3/3
P4	4	9	3/5
P5	6	4	3/4

A patient has an arrival time and stays in the waiting room until he's received by the doctor to be examined. At some point, the doctor is going to send him/her to do some more examinations (blood, scanner, ...). In the mean time, the doctor examines another patient. When the patient returns from the external examination, he reenters the waiting room and awaits his turn !

1. Implement the simulation of this system given that a patient is chosen from the waiting room on a first-come first-served basis and **WITHOUT the required tests**. Calculate the average global time (from the time they arrive till they leave) of patients as well as the average waiting time (when not ausculted by the doctor).
2. **Describe** a solution to simulate this system given that a patient is chosen from the waiting room on a first-come first-served basis and **WITH the required tests**. Calculate the average global time (from the time they arrive till they leave) of patients as well as the average waiting time (when not ausculted by the doctor).
3. What should we change in our simulation system in the case the choice of a patient is based on a low auscultation time ? Do not implement it but think about the changes to the queue data structure it would require in order to handle this situation.