Consider a two-stage manufacturing system where Stage 1 consists of an infinite capacity queue, referred to as queue 1, served by a single server, referred to as server 1. Stage 2, consists of a finite capacity queue, referred to as queue 2, served by a single server, referred to as server 2.

When queue 2 becomes full, server 1 stops. More specifically, upon service completion at server 1, the server gets blocked if the queue 2 is full. That is, the server cannot serve any other customers that may be waiting in queue 1. Server 1 will remain blocked until a customer departs from queue 2. In this case, a space will become available in queue 2 and the served customer in front of server 1 will be able to move into queue 2, thus freeing the server to serve other customer in queue 1.

Each server may also break down. For simplicity, we will assume that a server may break down whether it is busy or idle. A broken down server cannot provide service until it is repaired. If a customer was in service when the breakdown occurred, the customer will resume its service after the server is repaired without any loss to the service it received up to the time of the breakdown. That is, after the server becomes operational again, the customer will receive the balance of its service.

A sample of arrival data collected is attached in file 1.csv.

A sample of service time data collected at server 1 is attached in file 2.csv.

A sample of service time data collected at server 2 is attached in file 3. Csv.

Probability of server 1 breakdown is 0.23.

Probability of server 2 breakdown is 0.13.

You can take the capacity of queue 2 as 4.

Write a computer program to simulate the two-stage manufacturing system as described above. Run your simulation until the master clock is equal to 500.

Calculate the following parameters

1. Average waiting time in each queue.
2. Average time server 1 is blocked.
3. Average time server 1 and server 2 are down.