Basic Performance Indices and Workloads

The enclosed file `barrier.log` is a log file taken from a PLC sensor monitoring a machine in a production line. Each line of the log file has the following format:

`[yyyy:ddd:hh:mm:ss:f][eeee]`

Where:

- [yyyy] are four digits specifying a year
- [ddd] are three digits in the range [000-365] that identify a day in the year
- [hh] is an hour in range [00-23]
- [mm] is a minute in range [00-59]
- [ss] is a second in the range [00-59]
- [f] is a tenth of second, in the range [0-9]
- [eeee] is a four digit code representing an event:
    - [_IN_] – a raw part entered the machine
    - [_OUT] – a completed part exited the machine

For example :

```
[2023:167:10:51:12:1][_IN_]
```

Means that one sensor detected a raw part arriving at the machine on the 167th day of 2023, at 10:51:12 and 1 tenth of second.

Using this data and assuming that jobs are served in the order of arrival, one at a time, and not interrupted, compute:

- Arrival rate and throughput
- Average inter-arrival time
- Utilization
- Average Service Time
- Average Number of Jobs
- Average Response Time
- Probability of having *m* parts in the machine (with *m = 0, 1, 2*)
- Probability of having a response time less than τ, (with τ *= 30 sec, 3 min*)
- Probability of having an inter-arrival time shorter than τ, (with τ *= 1 min*)
- Probability of having a service time longer than τ, (with τ *= 1 min*)