POLITECNICO
MILANO 1863

HW1 report

Traffic Theory

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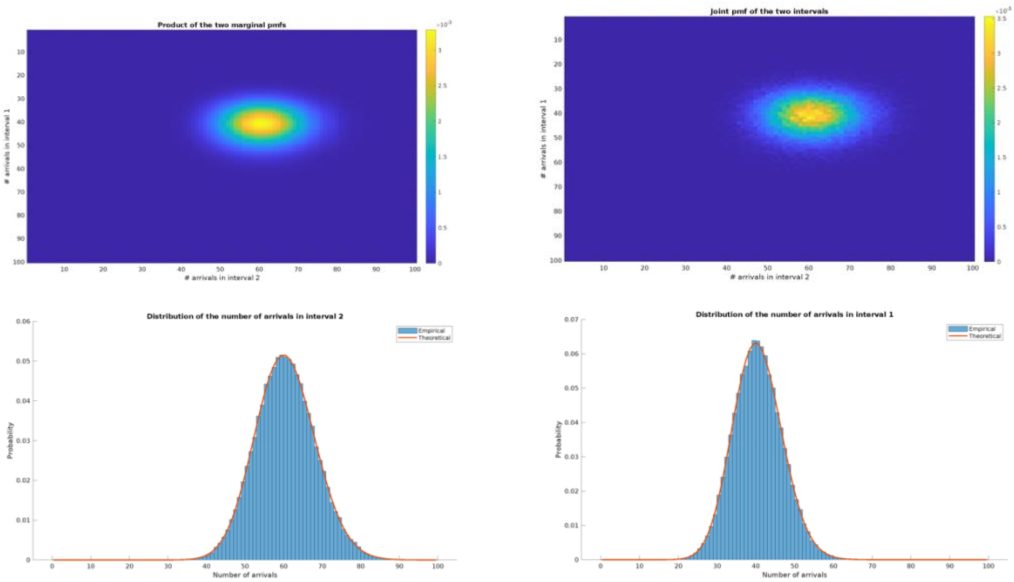
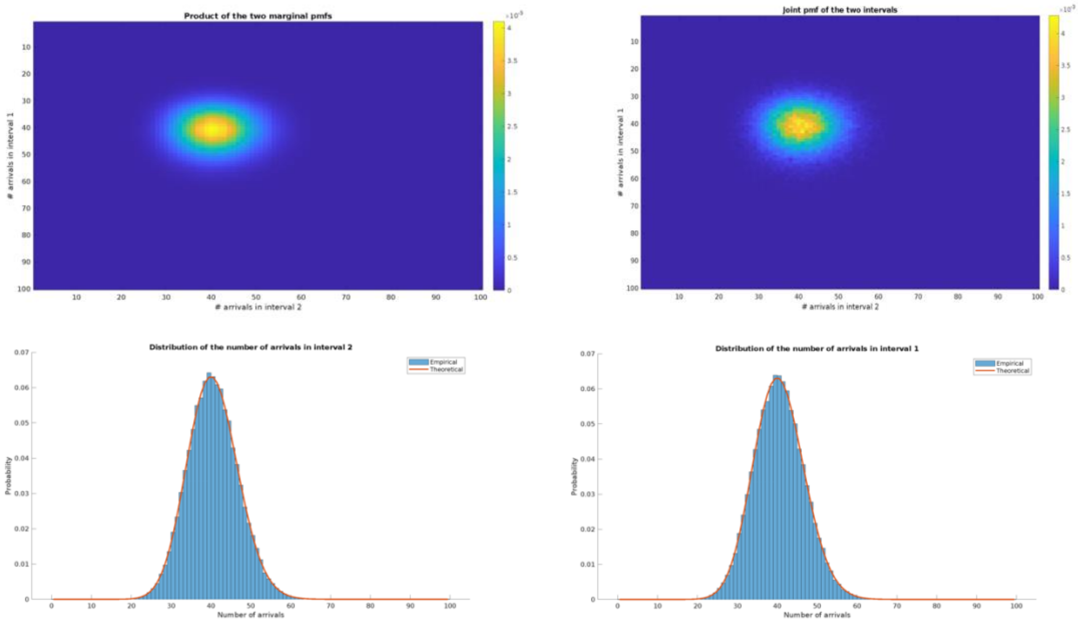
1. Non overlapping case



a. L1=20s, L2=30s

In the first subplot, you can see the joint PMF for the entire time interval, which combines the events from both intervals. It follows a Poisson distribution with the rate λ1 * L1 + λ2 * L2.

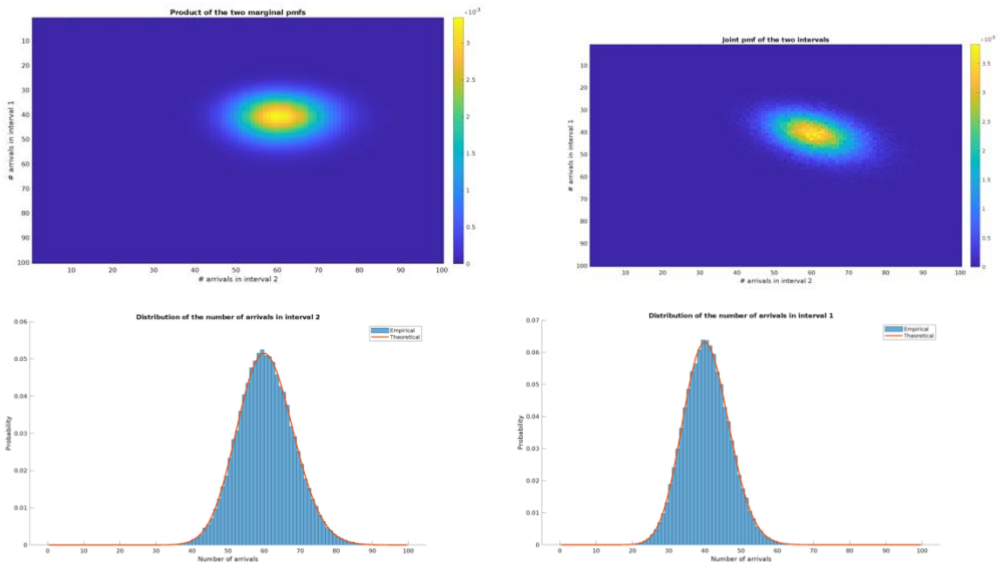
b. L1=L2=20s



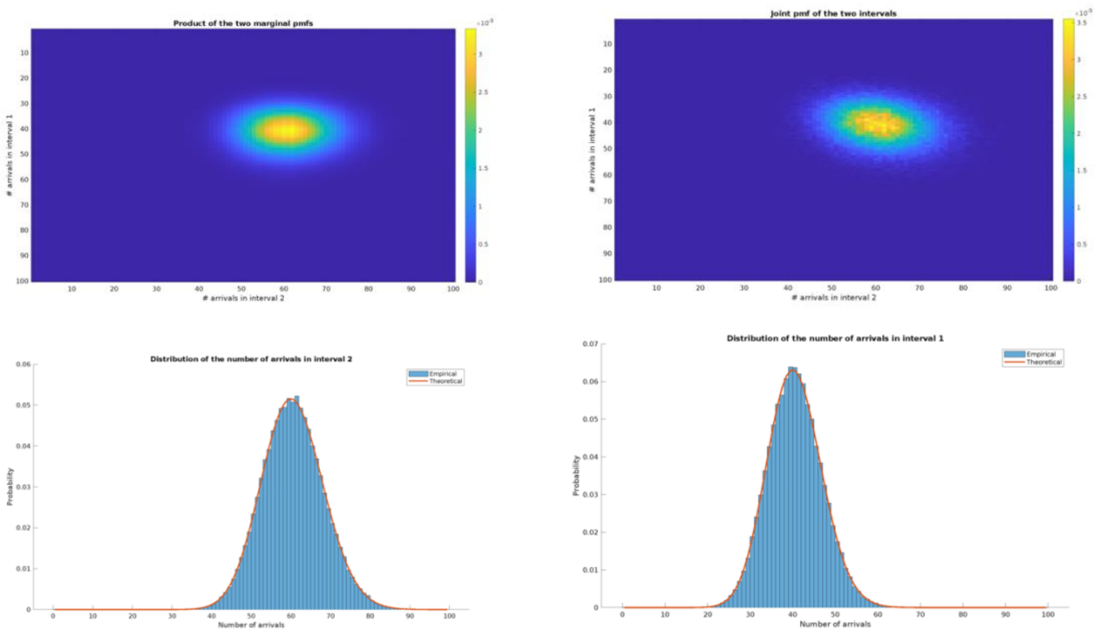
When l1 = l2, the joint PMF will follow a Poisson distribution with a rate of λ * L1 + λ * L2, but since L1 and L2 are equal, the rate will be the sum of the rates for both intervals. The marginal PMFs for each interval will follow Poisson distributions with rates λ * L1 and λ * L2, respectively.

In summary, when L1 = L2, the intervals have the same length, and the joint and marginal PMFs will reflect this equal allocation of time between the two intervals.

2. Overlapping case



In the first subplot, you can see the joint PMF for the initial overlap of 10 seconds. This joint PMF accounts for the events occurring in both intervals, as well as the events during the overlap.



In the subsequent subplots, the joint PMFs are plotted as the overlap is reduced to 5 seconds and eventually to 0 seconds. As the overlap reduces, the joint PMFs reflect fewer events occurring simultaneously in both intervals.

The key observation here is that as the overlap reduces, the joint PMFs become less wide and contain fewer possible values for the total number of events. This is because there are fewer opportunities for events to occur simultaneously in both intervals as the overlap decreases.