Project 4 – Deficit scheduler

Consider a source sending jobs to a server. Job interarrival times are IID RVs (to be described later), and their service times are IID RV (to be described later).
The server obeys the following discipline: it serves the jobs in the queue *atomically* (i.e., without preemption). Service occurs within one *turn*. The expected time that the server should spend on the source is Q. However:

- If the queue is empty, the turn is terminated
- If the next job cannot be served entirely before the end of the turn, the turn is terminated and the *remaining time* (called *deficit*) is saved and summed to the duration of the next turn. If the deficit is equal to D, then the next turn will be $Q+D$ units of time.

After a turn, the server then *goes on vacation* for some time. Vacations are IID RVs (to be described later). If a server comes back from vacation and finds the queue empty, it immediately starts a new vacation.

Study the response time of the above system as a function of the turn length Q using simulation. More in detail, at least the following scenarios must be evaluated:

- Constant interarrival times, constant service times, constant vacation; vary Q (at least from 1/10 to 10 service times).
- Exponential distribution of all the above RVs, with the same means as the previous case.

In all cases, it is up to the team to calibrate the scenarios so that meaningful results are obtained.

Project deliverables:

a) Documentation (according to the standards set during the lectures)
b) Simulator code
c) Presentation (up to 10 slides maximum)