Assignment 4

1. Traffic is modelled as an inhomogeneous Poisson process at a crossing where vehicles arrive at rates that depend on the time of the day. The rates are measured averages over time-intervals as follows:

Time-Interval	$\lambda(t)$ (cars per minute)
00:00 – 06:00	0.2
06:00 – 08:00	0.9
08:00 – 12:00	0.5
12:00 – 15:00	0.6
15:00 – 17:00	1.0
17:00 – 19:00	0.6
19:00 – 24:00	0.5

Implement the two methods that will give the event times in order: **the revised method and the thinning approach**. **Simulate the described arrival process using these methods.**

Using both methods, simulate 1000 Poisson processes.
(i) (2p) For each such simulation, **plot the average number of cars** that arrived at (and obviously left) the crossing **per minute over the period of 24 hours.**
(ii) (2p) **Also plot the cumulative number of cars that arrived per minute over the period of 24 hours**. As numerical results,
(iii) (1 p) **print the average number of cars that arrived in one day** and
(iv) (1 p) **the average time when the first car arrived**.

By the above plots and numbers you can check that your algorithms simulating the inhomogeneous Poisson process work right, since you know what you should get.

Please note that in the revised algorithm you need to sample the different numbers of events for the different realisations of the Poisson process (the first row in the pseudo algorithm: $m \sim Po(U_\lambda T)$. You can use your own algorithm for generating numbers from the Poisson distribution or use the library function numpy.random.poisson