1. A street lamp is replaced by a new one upon failure and upon scheduled times $T, 2T, \ldots$. A replacement always occurs at the scheduled times regardless of age of the lamp. The lifetimes of the lamps are iid random variables, with a common distribution Erlang$(2, \mu)$. What is the expected number of street lamps used in a scheduling interval.

2. A town has opened a depot for storing chemical waste. Amount of waste brought in each week has a gamma distribution with shape parameter $\alpha$ and scale parameter $\lambda$. The amounts brought in are iid rvs. (a) What is the expected number of weeks until the total amount of waste in the depot exceeds a critical level $L$. (b) Give an asymptotic estimate for the expected value from (a).

3. Limos depart the train station to the airport all day and night. The interdeparture times are independent uniformly distributed between 10 and 20 minutes. If you arrive at the train station at 3 o’clock in the afternoon, what are the estimates for the mean and standard deviation of your waiting time at the train station until a limo departs for the airport.

4. Derive the probability mass function for the number in system of a M/M/1/K queue. (K is the buffer size).