1. A tool crib has exponential interarrival and service times and it serves a very large group of mechanics. The mean time between arrivals is 4 minutes and it takes 3 minutes on average for a tool crib attendant to service a mechanic. The attendant is paid $10 per hour and mechanics are paid $15 per hour. Would it be advisable to have a second tool crib attendant?

2. A two-runway airport (one runway for takeoffs and one for landings) is being designed for propeller-driven aircraft. The time to land an airplane is known to be exponentially distributed with a mean of 1.5 minutes. If airplane arrivals are assumed to occur at random (exponential distribution), what arrival rate can be tolerated if the average wait in the sky is not to exceed 3 minutes?

3. A bakery produces one type a birthday cake. It takes exactly 15 minutes to decorate a cake, and the job is performed by one particular baker, who does nothing else at the bakery. What mean time between arrivals (exponentially distributed) can be accepted if the mean length of the decorating queue is not to exceed 5 cakes?

4. Suppose that mechanics arrive at a tool crib randomly according to a Poisson process with rate $\lambda=10$ per hour. It is known that the single tool clerk serves a mechanic in 4 minutes on average with a standard deviation of 2 minutes. Suppose that mechanics make $15 per hour. Determine the steady-state average cost per hour of mechanics waiting for tools.

5. A machine shop repairs small electric motors which arrive according to a Poisson process at a rate of 12 per week (5 day, 40 hour week). An analysis of past data indicates that engines can be repaired, on average, in 2.5 hours, with a variance of 1 hour$^2$. How many working hours should a customer expect to leave a motor at the repair shop (not knowing the status of the system)? If the variance of the repair time could be controlled, what variance would reduce the expected waiting time to 6.5 hours?