Assignment 3

Instructions

1. This assignment is due at 5pm on Friday 21st Mar 2014.
2. There is only one portion to hand in for this assignment: Submit a file that contains `R` code via the workbin on IVLE.
3. You may use the code in `assignment_03_template.R` to assist you, or you may write your own. If you use the template, you only have to fill in the lines where it says `YOUR CODE`.
4. You are not allowed to use functions such as `rpois` or `rbinom` from `R` .
5. Name your `R` file according to this convention: If your matriculation number is a999999u, then name the file `a999999u_assignment_03.R`.

Questions

1. An insurance company has 1000 policyholders, each of whom will independently make a claim in the next month with probability 0.05. Assuming that the amount of each claim made follows an $Exp(1/800)$ distribution, use simulation to estimate the probability that sum of these claims exceeds \$50,000. Simulate the sum of claims for 100,000 months and estimate the probability using these samples.
2. Buses arrive at a sporting event between 6pm and 9pm according to a homogeneous Poisson process with rate $\lambda = 5$ per hour. Each bus is equally likely to contain either 20, 21, ..., 40 fans, with the numbers in the different buses being independent. Simulate the bus arrivals for the 6pm to 7pm period 100,000 times, and estimate the probability that at least 200 fans arrive by 7pm.
3. Consider customers arriving at a bank according to a homogeneous Poisson process with rate $\lambda = 0.66$. Suppose there are an infinite number of service counters, so that there is no waiting time. Each customer is served immediately, in either exactly 2.3 time units or exactly 9.9 time units. With probability 0.35, a particular customer is served in 2.3 time units and with probability 0.65, he or she is served in exactly 9.9 time units. Simulate 100,000 realisations of this arrival process for the time interval $[0, 11]$, and estimate the mean number of customers that are still within the bank at time = 11.