Simulation of a Birth and Assassination Process[1]

Consider the birth and assassination problem:

- The head of the family is born at time 0, and is assassinated at a random time X, which has an exponential distribution.
- While alive, the head has children according to a Poisson process with rate λ.
- As soon as they are born, the children produce offspring, also according to Poisson process with rate λ. And their children produce offspring according to the Poisson(λ) process, and so on.
- When the head is assassinated, then his children become vulnerable to assassination. The time between when the parent is assassinated and a child is assassinated follows the exponential distribution, and is independent of the siblings assassination times.
- The process continues in this manner, where the offspring are protected from assassination until their parent is assassinated. Then they are subject to assassination (at a random exponential time), and while alive they continue to produce offspring (and their offspring produce offspring, ...) at rate λ.

For this assignment, you are to write a function that will simulate this stochastic process.

The name of this function will be **BAgen**. The inputs will be λ the birth rate; κ the assassination rate; and *maxGen* the maximum number of generations (of course the family could die out before reaching this maximum).

[1]This process was proposed and studied by Professor Aldous

The output will be a list with one element per generation. Each element will be a data frame, with have one row for each person born in that generation. The data frame will have four variables, $parentID$ the identifier for the parent, $childID$ the identifier for the child (a number from 1 to n, the total number of children born in that generation), birth date, assination date.

Some information that you may find useful about these distributions:

- A Poission(λ) process on a fixed interval, say (0, t), will have a random number of hits in that interval, where the number of hits follows the Poisson(λt) distribution. A hit in this case is the birth of a child.
- The location of these hits follows the uniform distribution on (0,t).