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S133-BQ
Assignment #4
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Here I had the max number of generations be 8, so that the factor of having entire family die out before they reach the end of max number of generations. I also decided to have the number of times I run the simulation be 10 to be sure I have reliable data.

Lambda	Kappa	Average Number of people	Average Life Span
0.1	0.4	163.8	5.045129
0.2	0.4	150.4	5.509023
0.3	0.4	452.9	6.629856
0.4	0.4	683.4	6.610493
0.5	0.4	1888.3	6.669723

Lambda obviously increases the number of people in the family, and has almost no effect on average life span.

Lambda	Kappa	Average Number of people	Average Life Span
0.2	0.1	169.6	26.18443
0.2	0.2	42	10.26407
0.2	0.3	23	4.476219
0.2	0.4	26	4.653826
0.2	0.5	22	3.922211

The higher the Kappa, the decrease in life span goes down and so does the lifespan.

```
BAgen = function(lambda, kappa, maxGen)
{
      #helper functions
      numChildren = function(frame, row){
            kids = rpois(1, lambda*(frame[row, ]$Death - frame[row,
]$Birth))
            return (kids)
      }

      childBirth = function(frame, row){
            Birth = runif(1, min = frame[row, ]$Birth, max = frame[row,
]$Death)
            return (Birth)
      }
      childDeath = function(frame, row){
            Death = frame[row, ]$Death + rexp(1, rate = kappa)
            return (Death)
      }
    maxGen = maxGen - 1
    head = data.frame(PID=0, CID=1, Birth = 0,
Death=rexp(1,rate=kappa))
    family = list(head)
    numGen = 1
    for(generations in 1:maxGen)
    {
        generation = family[[generations]]
        if(numGen < length(family))
            break
            childID = 1
        newGeneration = data.frame("PID" = NULL, "CID" = NULL, "Birth"
= NULL, "Death" = NULL)
        for(parent in 1:nrow(generation))
        {
            for(i in 1:numChildren(generation,parent)){
                newGeneration = rbind(newGeneration, data.frame("PID"=
generation[parent, ]$CID,

            "CID" = childID,

            "Birth" = childBirth(generation, parent),

            "Death" = childDeath(generation, parent)))
                childID = childID + 1
            }
        }
    numGen = numGen + 1
    family = c(family, list(newGeneration))
    }
    return(family)
}
```