Bus\_Ridership

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# 1. Consider the following model for a bus-ridership analysis: ###ˆ at

each stop, each passenger is likely to get off the bus independent of others with a 20% chance;

## at every stop, there is a 50%/40%/10% chance of 0/1/2 passengers getting on board;

## the bus never gets full; new passengers at any stop can always be accommodated;

## bus is empty when it arrives at the first stop.

Write an R code to calculate using simulation the probability that the bus is empty after visiting the tenth stop.

### Code to simulate entering and exiting the bus by useing sample and probablity

entering\_bus = function(){  
   
 return(sample(c(0,1,2),size = 1,prob = c(0.50,0.40,0.10)))  
}  
exiting\_bus = function(){  
 return(sample(c(1,0),size = 1,prob = c(0.20,0.80)))  
}

### Code to test the function

entering\_bus()

## [1] 0

exiting\_bus()

## [1] 0

### code to simulate the exinting and entring the bus till 10 stops

bus\_10Passenger = function(){  
 bus\_seat=c()  
 for (j in c(1:10)) {  
 if (j == 1) {  
 # c(x, "b")  
 bus\_seat=c(bus\_seat,entering\_bus())  
 }  
 else if(bus\_seat[j-1]==0){  
 bus\_seat=c(bus\_seat,entering\_bus())  
 }  
 else {  
 bus\_seat=c(bus\_seat,bus\_seat[j-1]+entering\_bus()-exiting\_bus())  
 # bus\_seat  
 }  
 }  
 return(bus\_seat)  
}

running 100000 simulation people entering and exiting the bus

nsimuationss=100000  
simulatedData = replicate(nsimuationss,bus\_10Passenger())

count of no entries present in the 10th stop

table(simulatedData[10,])

##   
## 0 1 2 3 4 5 6 7 8 9 10 11 12   
## 2181 6222 11223 15340 17800 16334 12978 8748 5095 2522 1048 374 105   
## 13 14 15   
## 23 6 1

probablity that the bus is empty at 10th stop

sum(simulatedData[10,]==0)/length(simulatedData[10,])

## [1] 0.02181