#Set the number of simulations

num\_simulations = 10000

This is assigned to count the number of times the bus is empty after running the simulations n(assigned) number of times

count = 0

#No of stops

stops = 10

#We simulate for each stop and all the given conditions that is

for (i in 1:num\_simulations) {  
 passengers\_on\_bus <- 0  
   
 for (stop in 1:stops) {  
 #check for condition 1, that is, likely to get on the bus independent of others with a 20% chance  
 passengers\_alighting = sum(sample(c(0, 1), passengers\_on\_bus, replace = TRUE, prob = c(0.8, 0.2)))  
 passengers\_on\_bus = passengers\_on\_bus - passengers\_alighting   
   
 #check for condition 2, that is, there is a 50%/40%/10% chance of 0/1/2 passengers getting on board  
 passengers\_boarding <- sum(sample(0:2, 1, replace = TRUE, prob = c(0.5, 0.4, 0.1)))  
 passengers\_on\_bus = passengers\_on\_bus + passengers\_boarding  
   
 # Ensure the number of passengers on the bus doesn't go negative  
 passengers\_on\_bus = max(0, passengers\_on\_bus)  
 }  
 # Check if the bus is empty after the 10th stop and increment count if true  
 if (passengers\_on\_bus == 0)   
 count = count +1  
}

#Check if the bus is empty after the 10th stop. If it is empty we increment count by 1

count

## [1] 529

#Calculate the probability

prob\_empty = count / num\_simulations  
(prob\_empty)

## [1] 0.0529