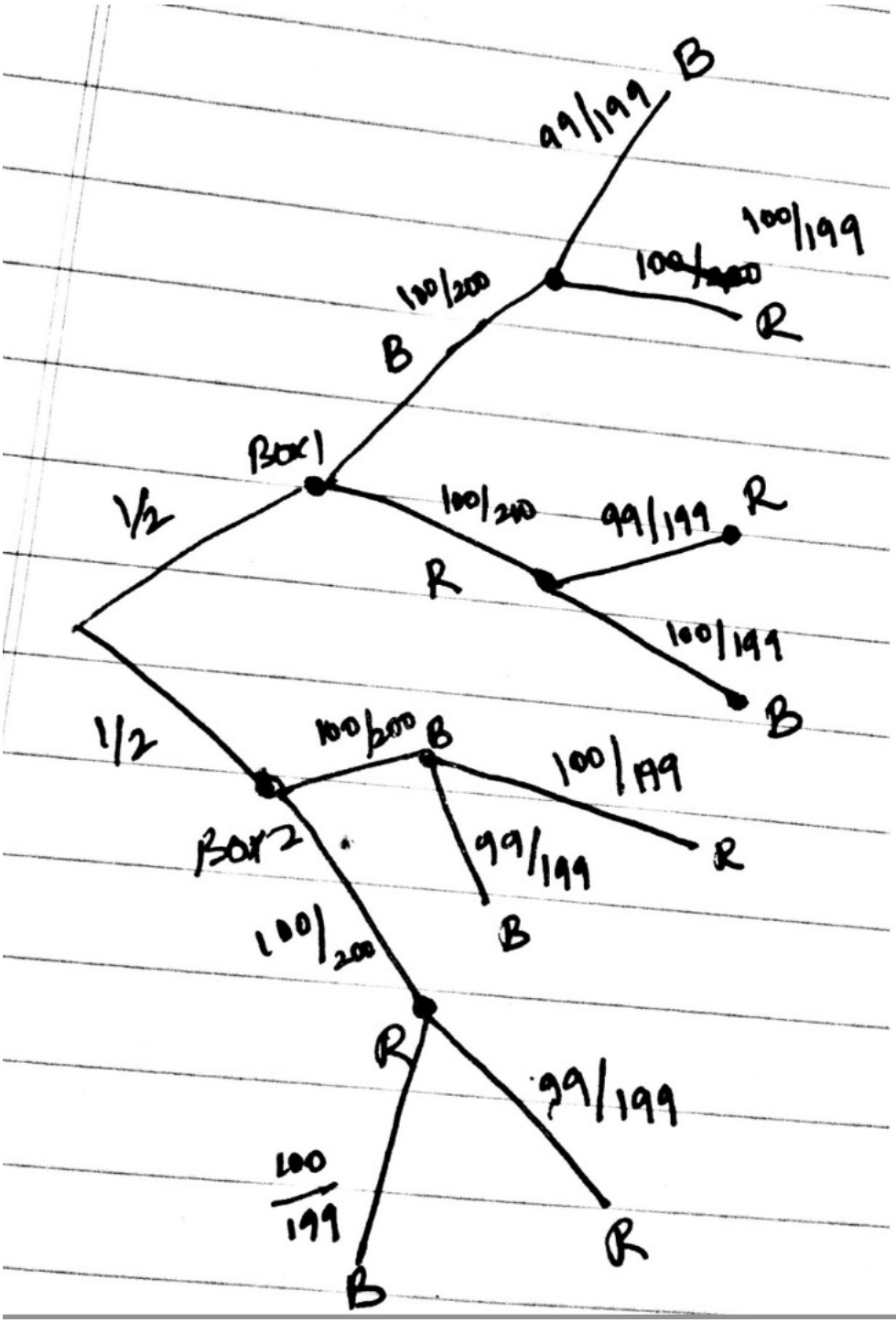
In-class Problems
27.4

1. . Suppose there are two boxes, each of which contains 200 balls: 100 red balls numbered from 1 to 100, and 100 blue balls numbered from 1 to 100. We pick one ball at random from each box. (a) Given that at least one of the two balls picked is red, what is the probability that both are red?

   Solution:

   R1 = event that first ball is Red R2 = event that second ball is Red Note we choose one ball from each box.

   Below is a tree diagram, which should probabilty for 2 successive balls picked from respective boxes:



Using this tree we will find $P(R2|R1)$.

The Probability of picking another red ball given we have picked a red ball is = Number of all event outcomes / Number of all possible outcomes

No of all possible outcomes = All outcomes of drawing second red ball

(regardless of the first ball) =

$(1/2 * 1/2 * 99/199) + (1/2 + 1/2 * 100/199) + (1/2 * 1/2 * 100/199) + (1/2 * 1/2 * 99/199)$

no of event outcomes(choosing 2 red balls) $= (1/2 * 1/2 * 99/199) + (1/2 * 1/2 * 99/199)$

thus $P(R2|R1)$ =(1/2*1/2*99/199) + (1/2*1/2*99/199)/((1/2*1/2*99/199) + (1/2 +1/2*100/199) + (1/2 * 1/2* 100/199) +(1/2*1/2*99/199))

$= (99/199+99/199)/(99/199+100/199+100/199+99/199) = 198/398 = 99/199$