

(*): Assigned to weekly problem set.

Conditional Probability in R

1. (*) Create an R function of 3 variables (a, b, p) that performs one game of Gambler's Ruin, assuming the first gambler starts with $\$a$, that the second starts with $\$b$, and that the first player has probability p of winning each bet. The output of the function should be 1 if the winner is the first player, and 2 if the winner is the second player. *Things to think about: do I need a loop? If so, how many times do I need to iterate? What does my function need to output?*

Then use your function to approximate the probability that the first gambler wins, if $a = 3$, $b = 7$ and $p = 0.6$. Compare your estimated probability to the theoretical probability calculated in Section 2.7.

Some starter code to begin your function:

```
gamblers_ruin <- function(a, b, p){  
  # your code here  
}
```

2. (*) We will simulate Example 2.5.10 from the textbook where conditional independence doesn't imply independence. Suppose we have two coins, one that is fair and one that lands on Heads with probability $3/4$. We take one coin at random and flip it twice. Let A be the event that the first toss lands Heads, B the event that the second toss lands Heads, and C the event that the fair coin was selected. Using R, demonstrate that A and B are conditionally independent given C , but are unconditionally dependent.