

RAM Maths Circle

March 8, 2026

Nagpur

Introduction

Independent event: The occurrence of one event does not change the probability of another event occurring.

Dependent event: The outcome of the first event affects the probability of the second event.

Problem: Three Prisoners Puzzle

There are three prisoners: A , B , and C . One of them will be released and the other two will be executed. The warden knows who is going to be released, but he will not reveal it directly.

Prisoner A asks the warden to give the information indirectly using the following rules:

- If B is released, tell me that C will be executed.
- If C is released, tell me that B will be executed.
- If I (A) am released, toss a coin:
 - If the coin shows Head, tell me that B will be executed.
 - If the coin shows Tail, tell me that C will be executed.

Prisoner A claims that after hearing the warden's statement his probability of being released increases from

$$\frac{1}{3} \text{ to } \frac{1}{2}.$$

However, prisoner C argues that the probability of A being released is still

$$\frac{1}{3},$$

and that his own probability of being released becomes

$$\frac{2}{3}.$$

Question: Who is correct?

The warden finally makes the statement:

“Prisoner B will be executed.”

The Card Game

Game Description

Cards: 10 playing cards with different values (Ace lowest, King highest).

Goal: The student must stop when they think the highest card has appeared.

Algorithm

Card Reveal Game [1]

Shuffle the 10 cards randomly Place the cards face down

$i = 1$ to 10 Reveal card i Show value of card i to the student Ask student: "Stop or Continue?"
student chooses Stop card i is the highest among all 10 cards Student wins Student loses End
game

If student never stopped, reveal remaining cards Check if last revealed card was highest Deter-
mine win or loss