

Statistical Simulation in Python

STATISTICAL SIMULATION IN PYTHON



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Topics covered

- Basics of randomness & simulation.
- Simulation & probability.
- Bootstrapping and resampling methods.
- Advanced applications of simulation.

Introduction to random variables

Continuous Random Variables

- Infinitely many possible values.
- e.g., Height / Weight



Introduction to random variables

Continuous Random Variables

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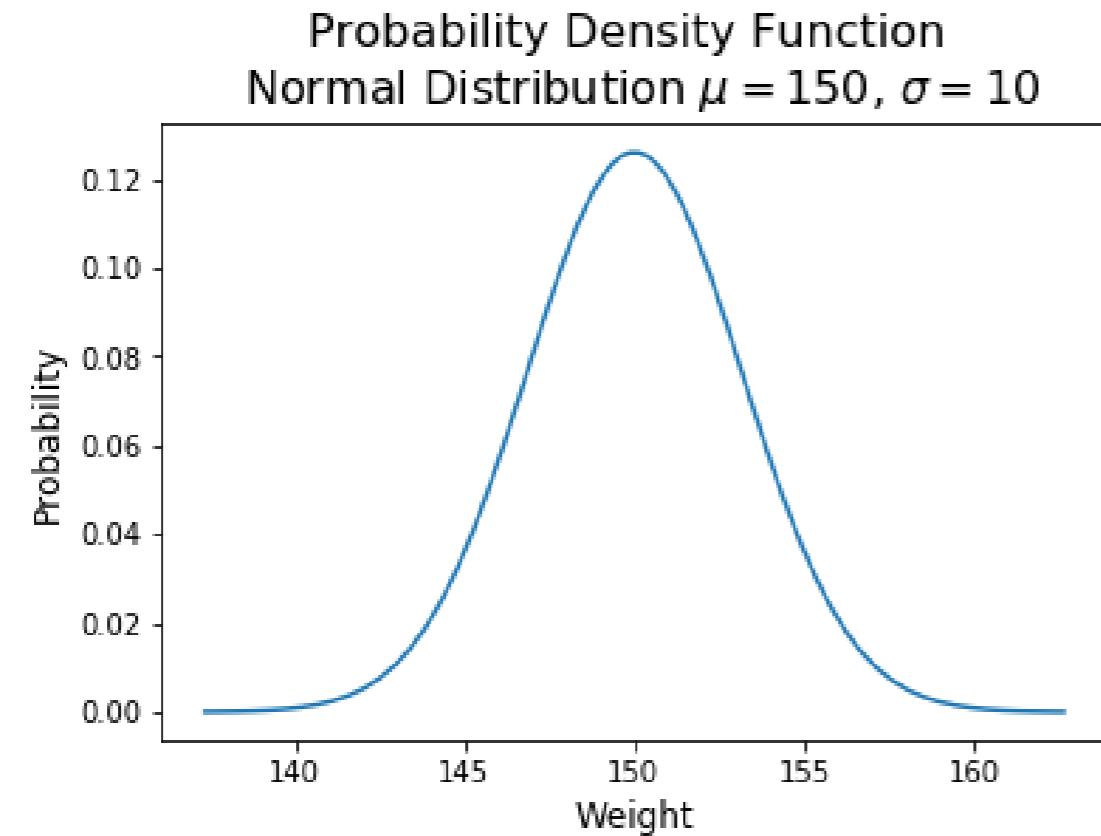
Discrete Random Variables

- Finite set of possible values.
- e.g., Outcomes of a six-sided die



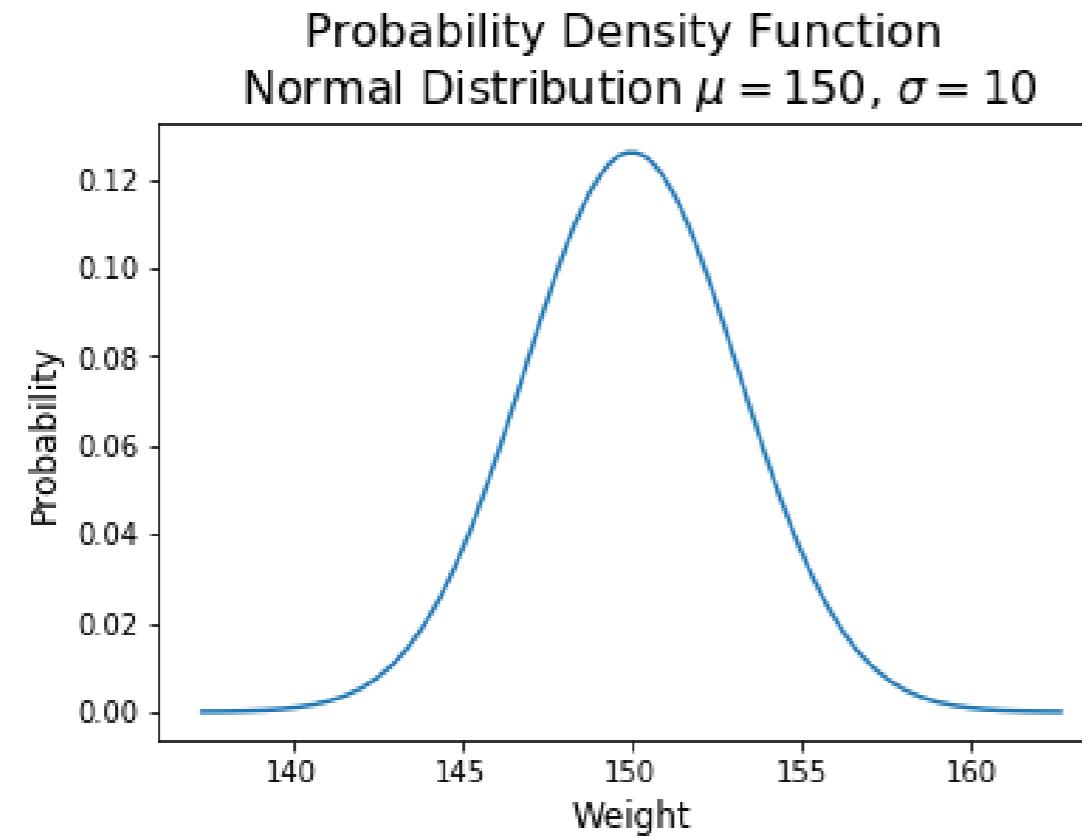
Probability distributions

Continuous Probability Distributions

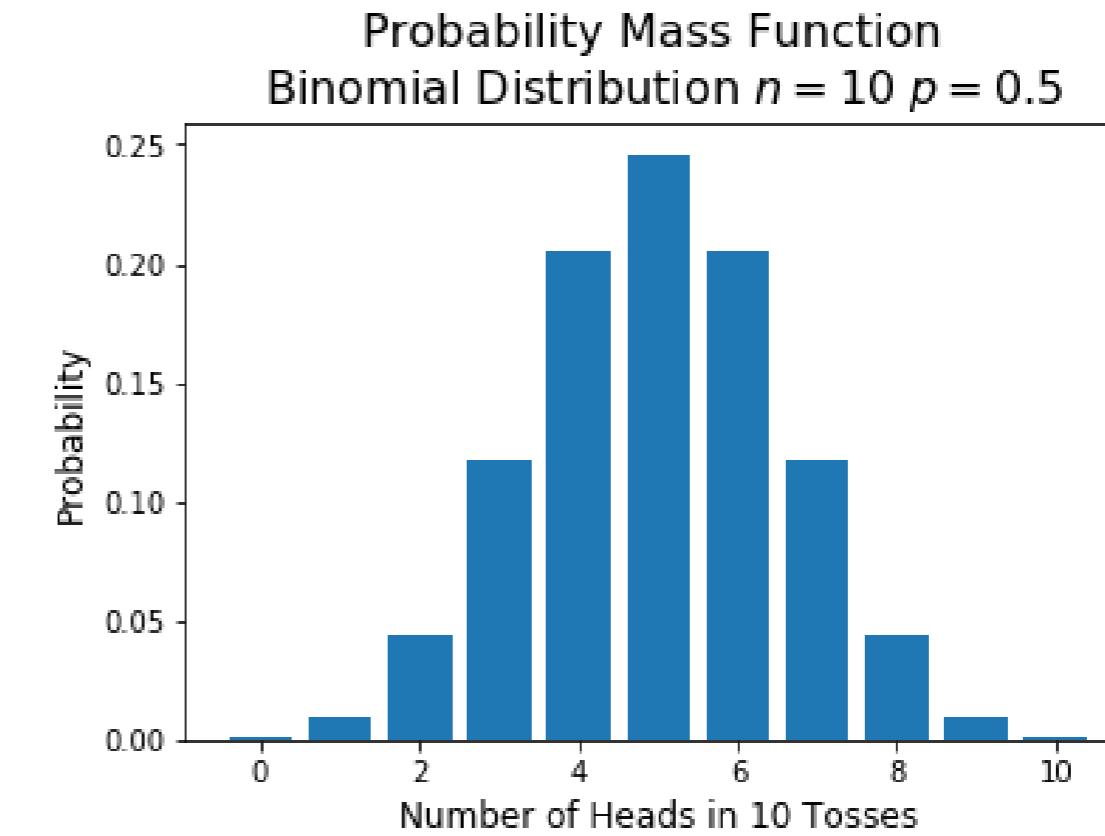


Probability distributions

Continuous Probability Distributions



Discrete Probability Distributions

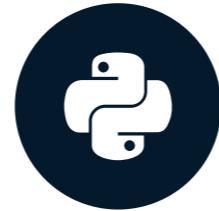


Let's practice!

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Simulation basics

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Simulations

Framework for modeling real-world events.

- Characterized by repeated random sampling.

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Framework for modeling real-world events.

- Characterized by repeated random sampling.
- Gives us an approximate solution.
- Can help solve complex problems.

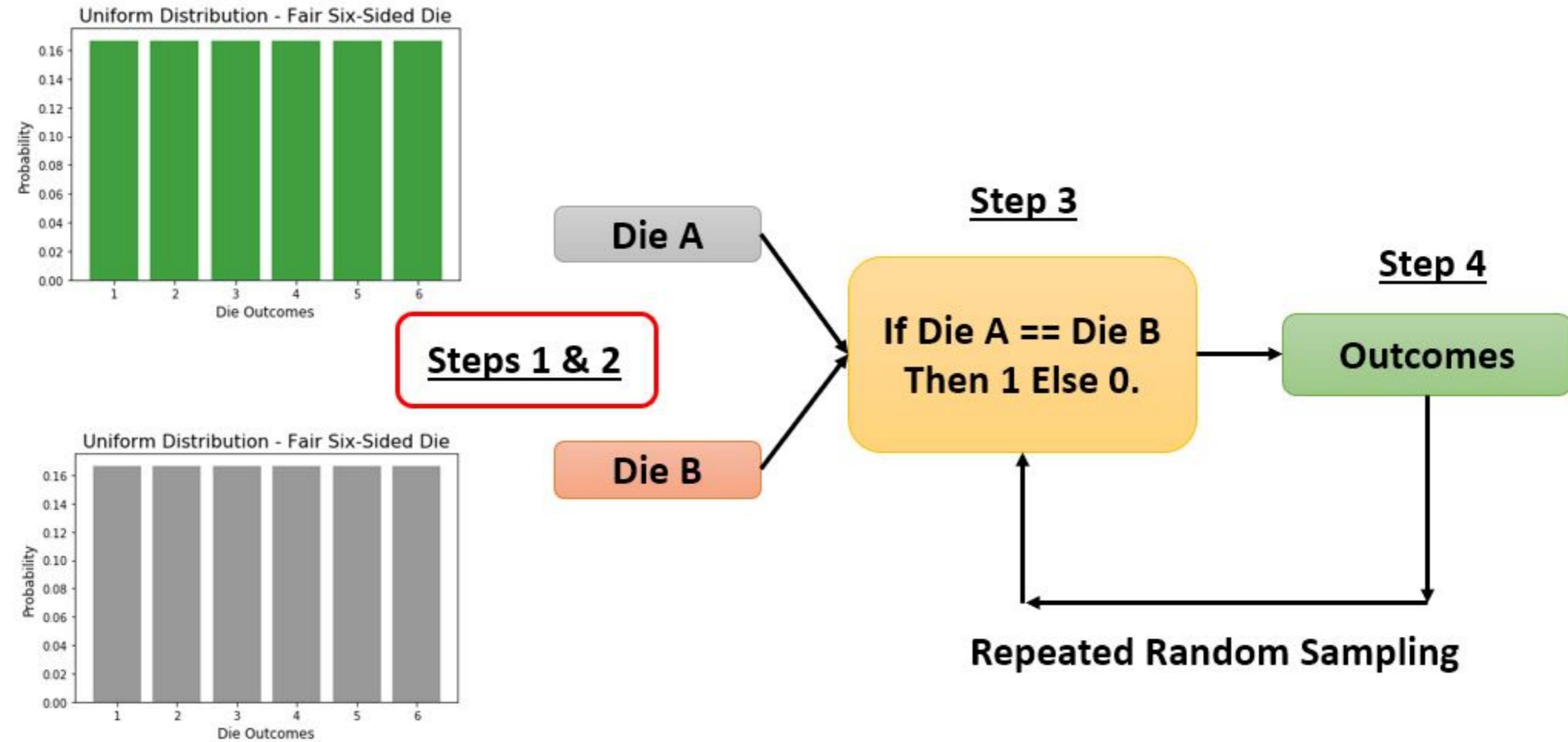
Simulation steps

1. Define possible outcomes for random variables.
2. Assign probabilities.
3. Define relationships between random variables.

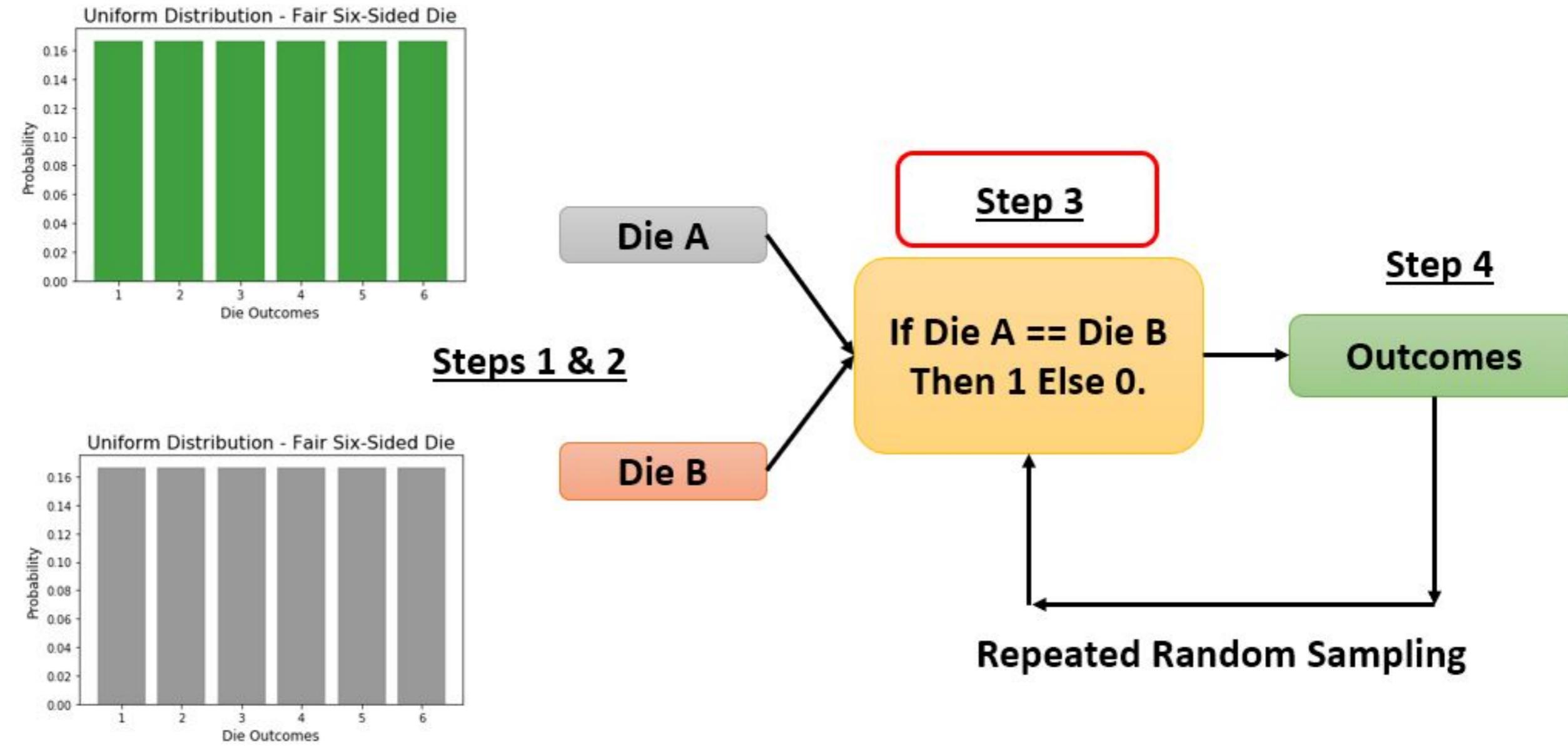
Simulation steps

1. Define possible outcomes for random variables.
2. Assign probabilities.
3. Define relationships between random variables.
4. Get multiple outcomes by repeated random sampling.
5. Analyze sample outcomes.

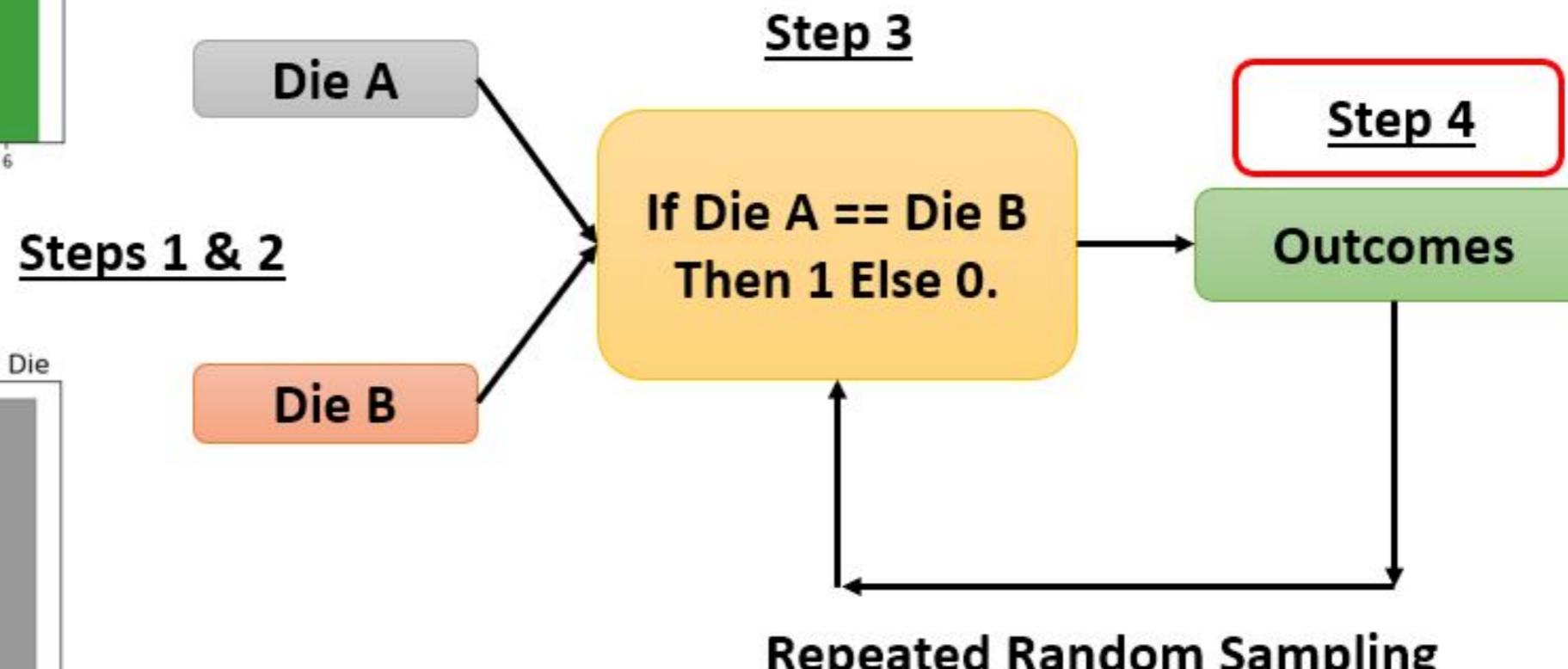
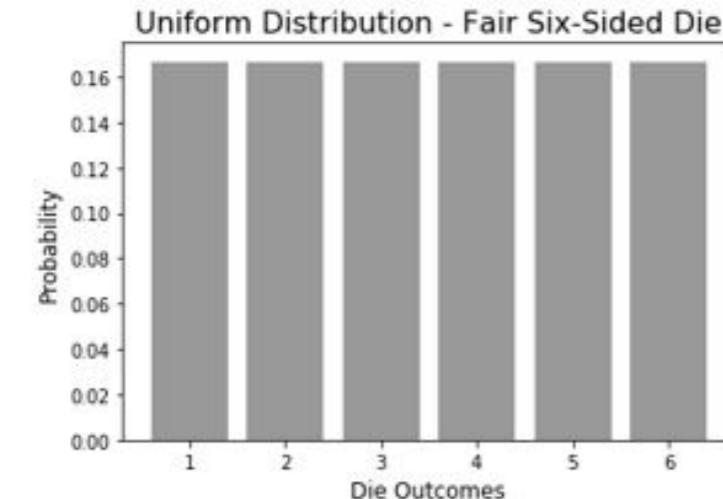
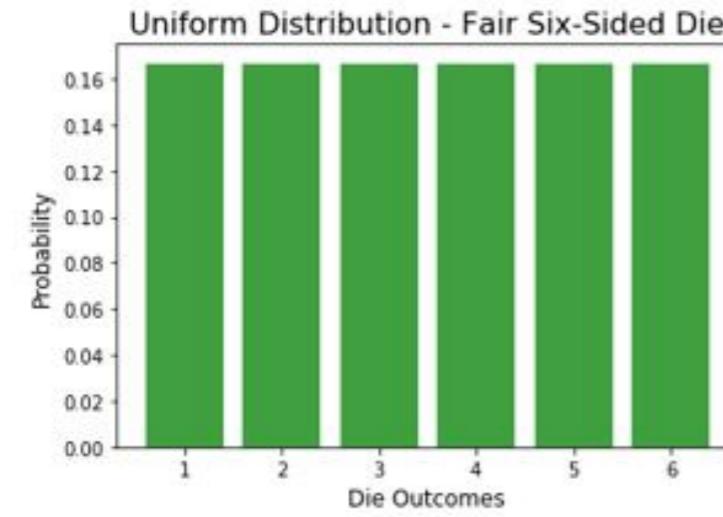
Simulating the dice game



Simulating the dice game



Simulating the dice game

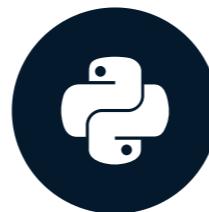


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Using simulation for decision-making

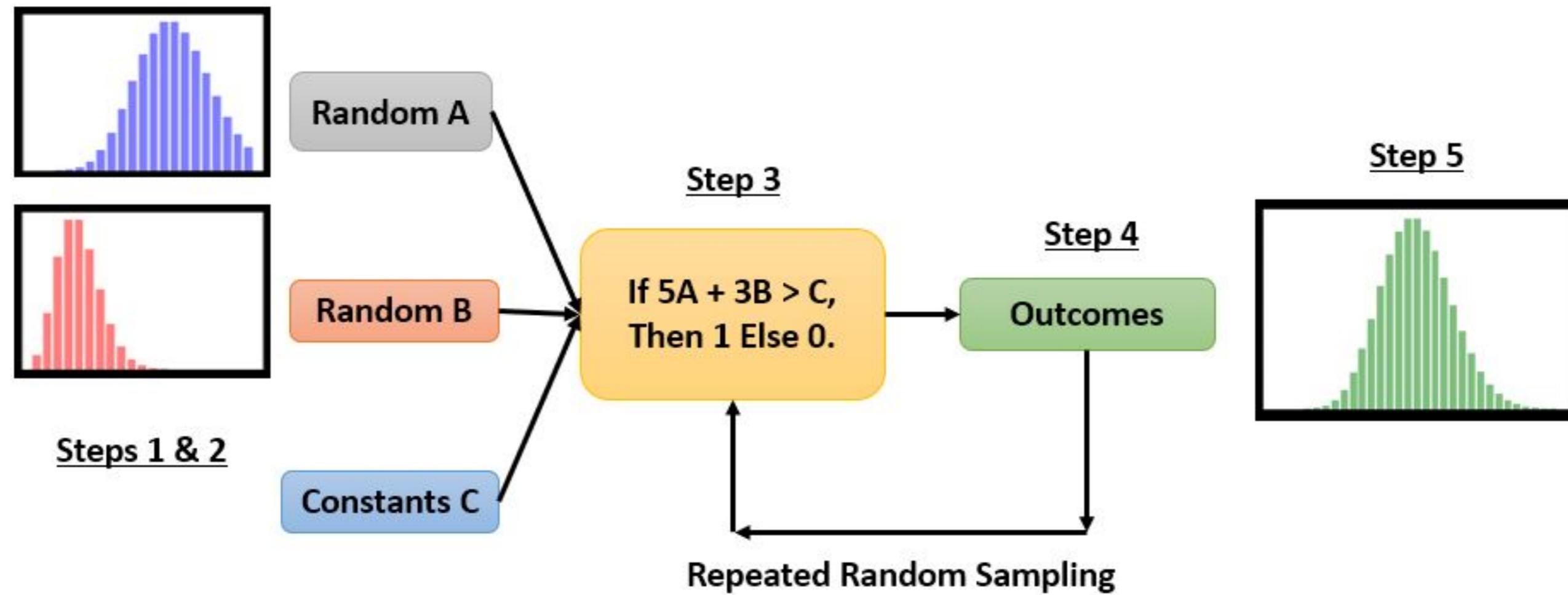
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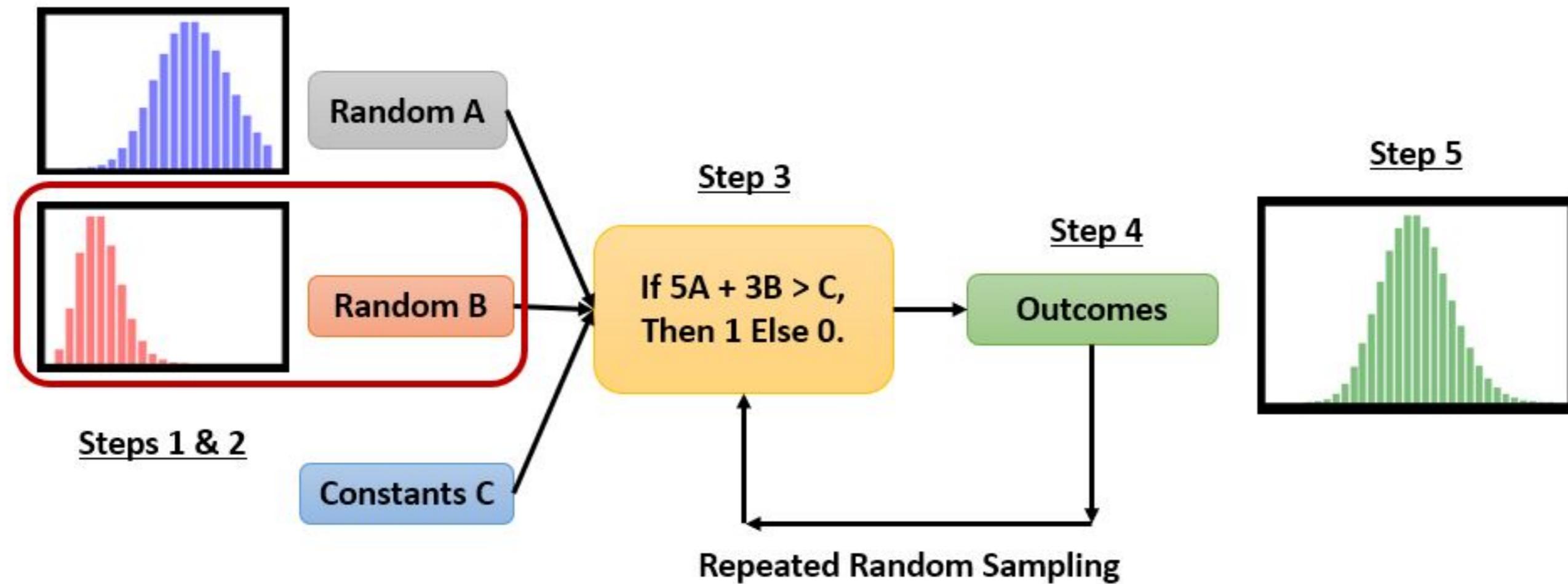
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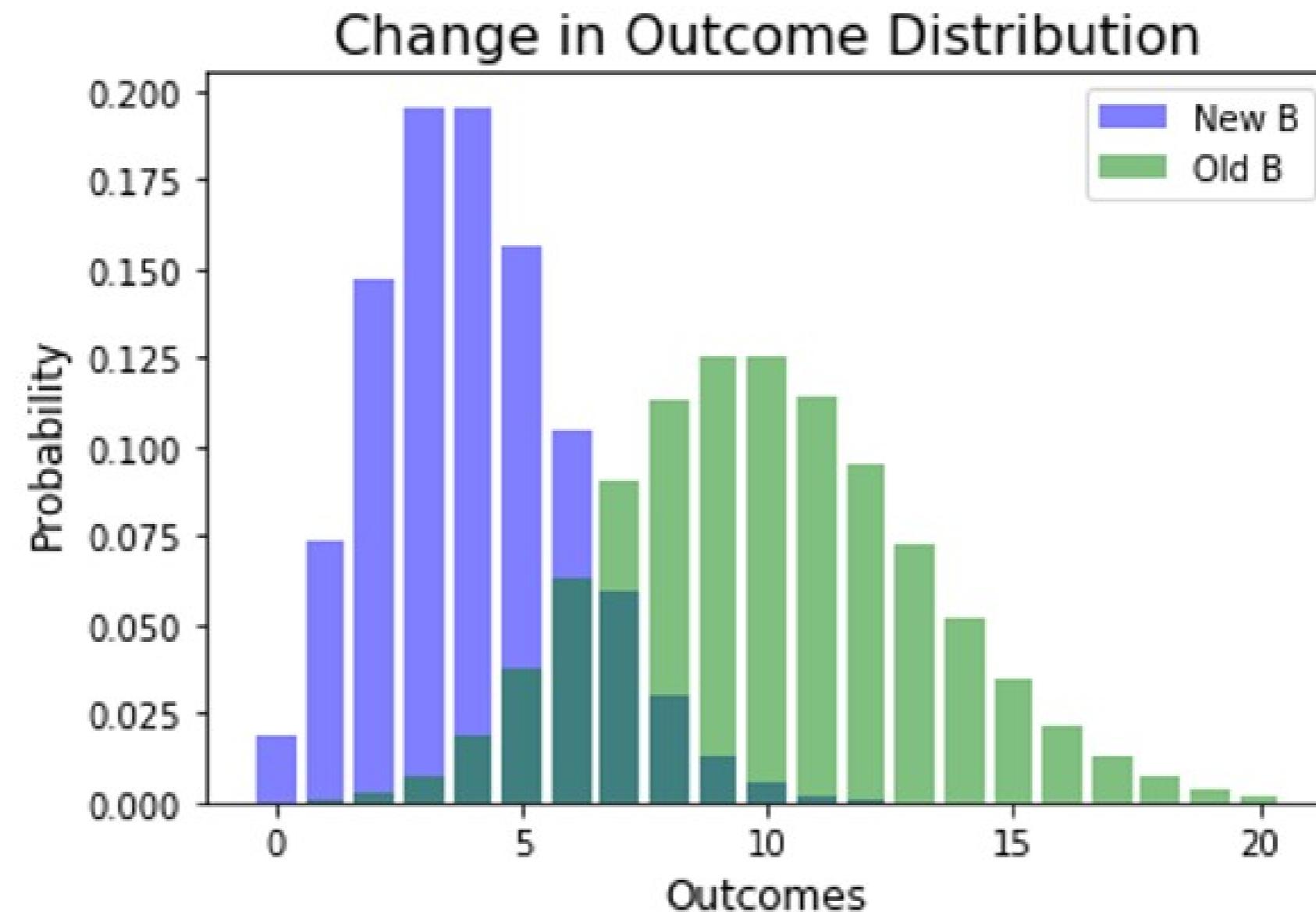
Simulation workflow



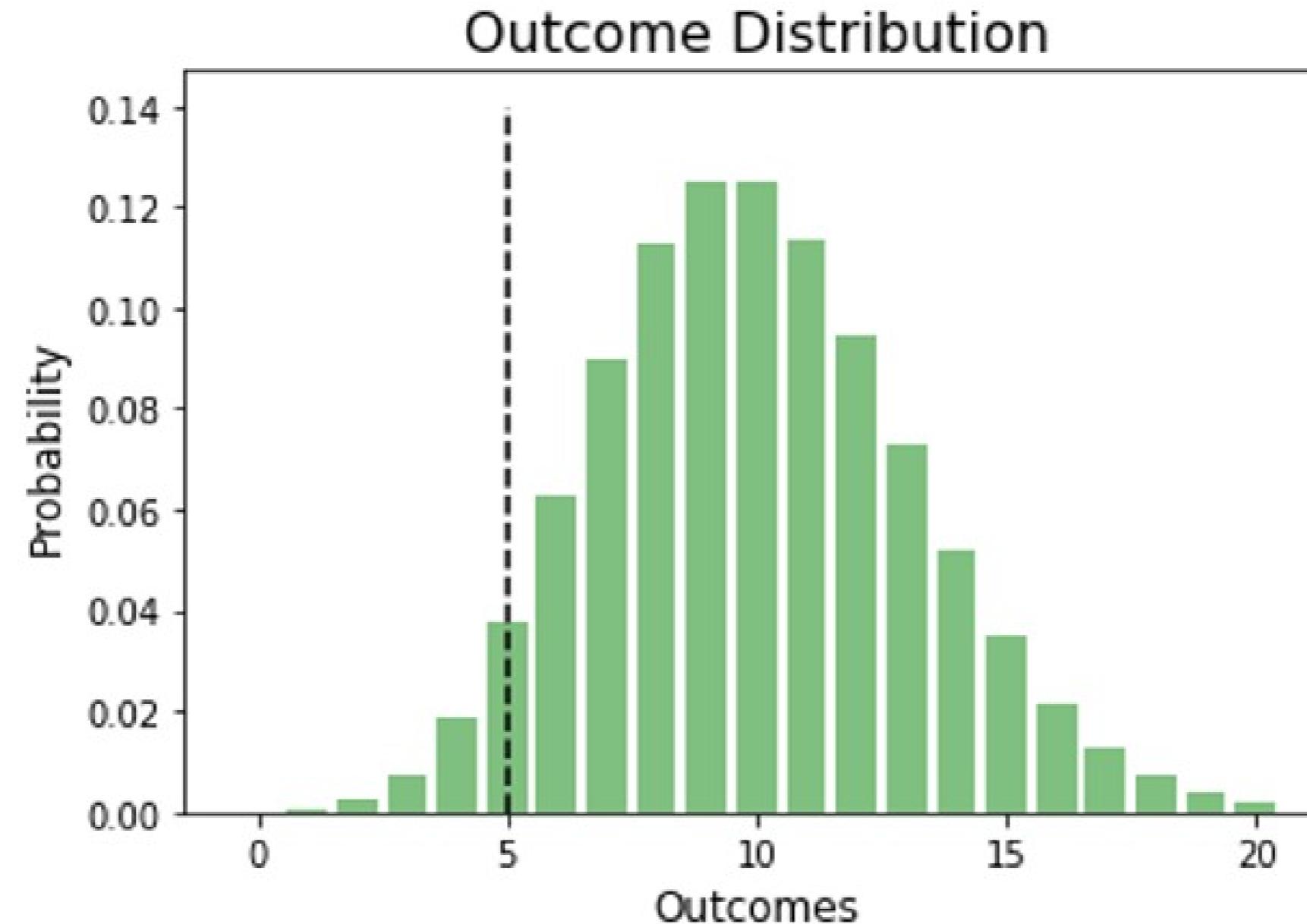
Change input, evaluate output



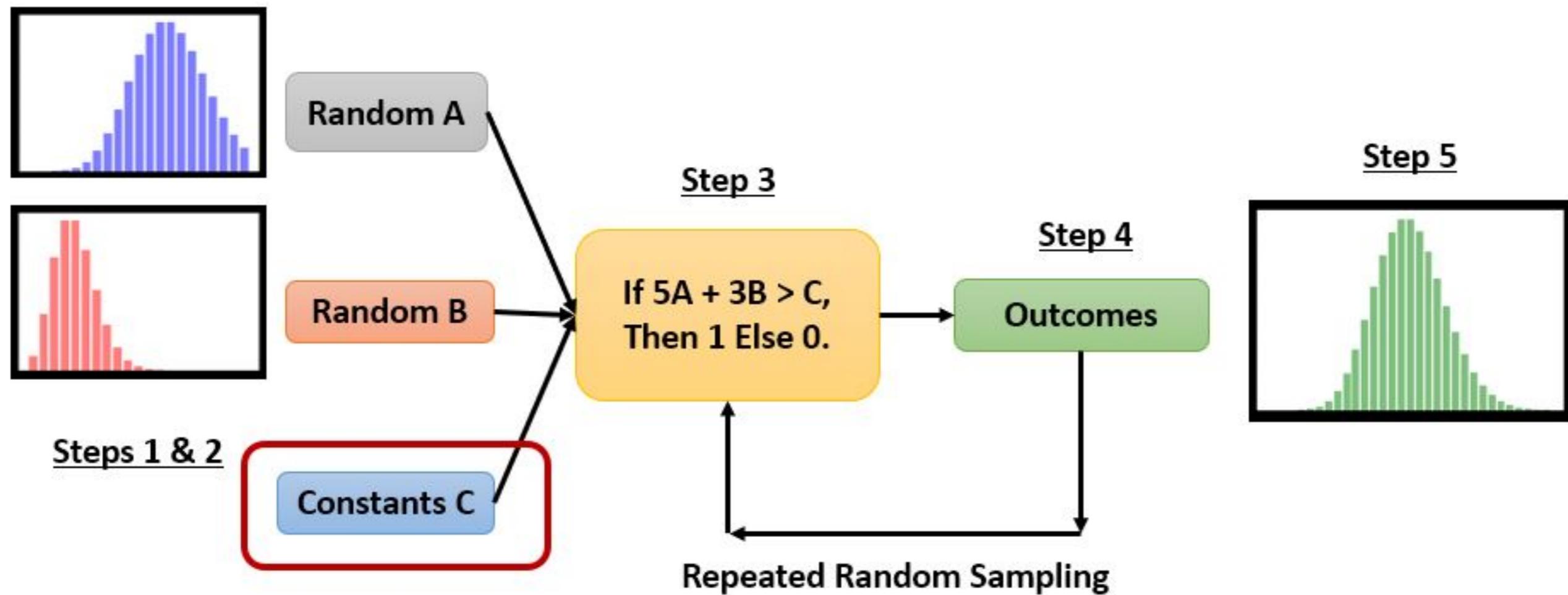
Outcomes: New B vs. Old B



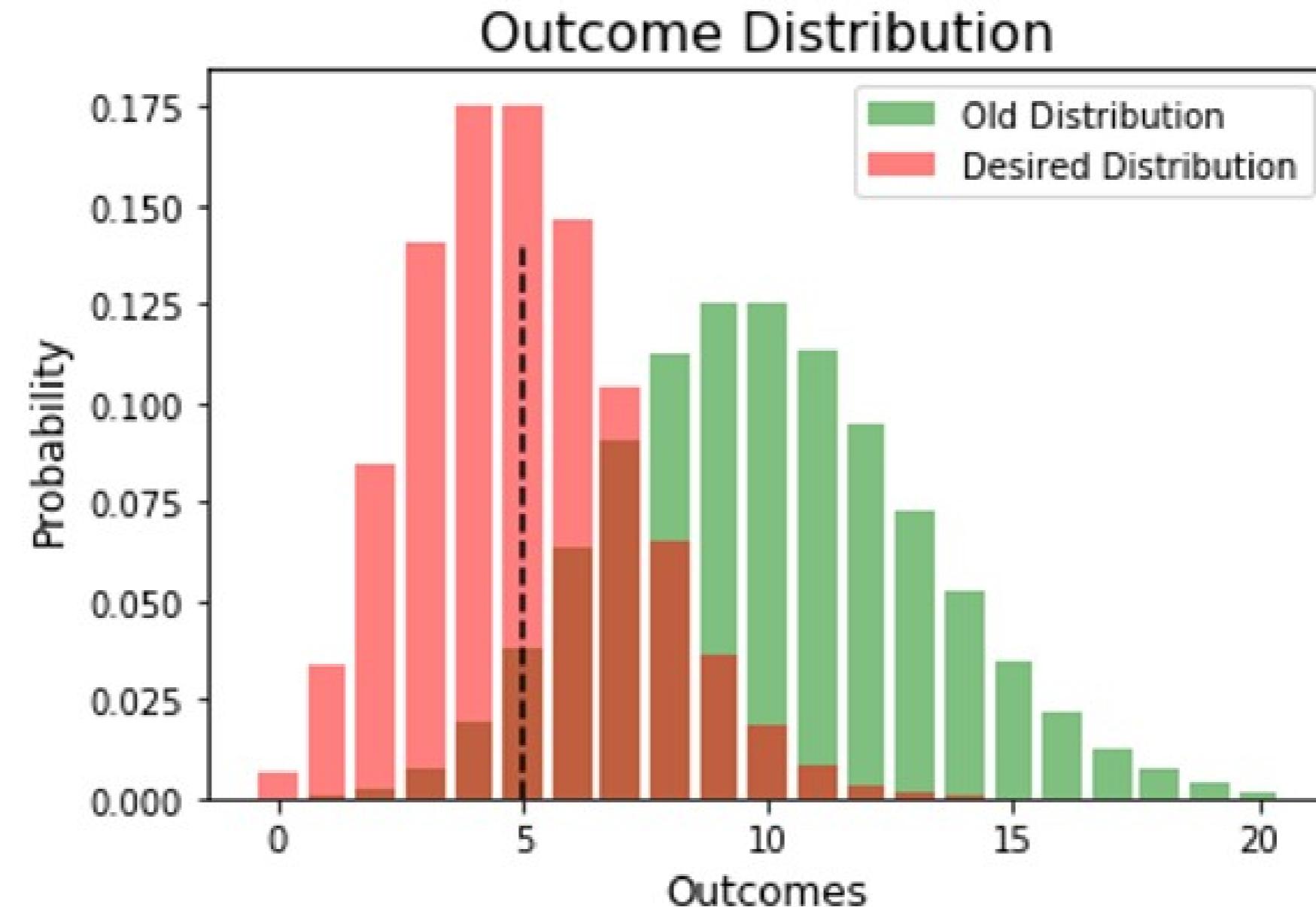
Change input to get desired output



Modify C and record outcomes



Change input to get desired output



Let's practice!

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