Simulations of simple versus related compound events

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Why is $0\text{–}5 = \text{H}$ and $6\text{–}9 = \text{T}$ not a fair-coin model? [2 marks]

The groups have unequal sizes.

Answer: H has chance $\frac{6}{10}$ and T $\frac{4}{10}$.

2. Map 0-4 to H and 5-9 to T. Convert 82, 16, 73, 40 into outcomes. [2 marks]

Classify each digit, keeping its order.

Answer: TH, HT, TH, HH.

3. The simulated outcomes are TH, HT, TH, HH. Estimate $P(\text{exactly one head})$. [2 marks]

TH, HT and TH are successes.

Answer: $\frac{3}{4}$

4. Give a random-digit model for success probability 0.3. [2 marks]

Three of ten equally likely digits mean success.

Answer: For example, $0\text{–}2 = \text{success}$ and $3\text{–}9 = \text{failure}$.

5. A without-replacement simulation selects the same labelled counter twice in a trial. What needs fixing? [2 marks]

A physical counter cannot be selected while it is kept out.

Answer: Remove the first selected label before selecting the second.

6. An event occurs 198 times in 500 correctly modelled trials. Give an estimate and one limitation. [3 marks]

$\frac{198}{500} = 0.396$.

More trials help stability, but the model must also fit the real rules.

Answer: 0.396; a finite simulation still varies randomly.