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Probability

Question 1

Question 2

Part 1

Answer: Not Independent

The probability of getting 2 consecutive flips in 4 coin flips is . The total number of flips is 16. I will now find the complement or the number of flips of four counts without consecutive heads. This requirement implies that there can be no more than two heads in total.When there are zero heads there is 1 possible sequence. When there is 1 head, there are 4 possible sequences. When there are two heads, there are 3 sequences.This leaves, 8 possibilities. Thus the probability is ½

The probability that the first or last flip yields tails means that either one or both must be heads. Thus the probability that the first or last is heads is 1/2 . The probability that both are heads is ½ * ½ or ¼. Adding this together gives ¾.

The intersection of these two events is 5/16 and P(A)*P(B) is 6/16.

Part 2

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Question 3

Question 4

Part 1

1. $P(A|B) = \frac{P(A \cap B) * P(B)}{P(B)}$
2. $P(innocent|matches\ the\ description) = \frac{P(innocent\ and\ matches\ description) * P(matches\ description)}{P(matches\ description)}$
3. $= \frac{99/100000}{100/100000}$

Answer: $\frac{99}{100}$

Part 2

1. $P(A|B) = \frac{P(A \cap B) * P(B)}{P(B)}$
2. $P(matches\ description|innocent) = \frac{P(innocent\ and\ matches\ description) * P(innocent)}{P(innocent)}$
3. $= \frac{99/100000}{99999/100000}$

Answer: $\frac{99}{99999}$

Part 3

1. It is easier to find the complement: $1 - P(none\ match)$
2. $P(none\ match) = \frac{none\ matched\ from\ population}{1000\ from\ population}$

Answer: $1 - \frac{99900C1000}{100000C1000}$

Question 5