

If three fair coins are each tossed once and at least two of them come up Heads, what is the probability that all three come up Heads?

(a) $1/4$

(b) $1/2$

(c) 1

(d) $1/3$

(e) $3/4$

(f) $1/8$

(g) $3/8$

(h) $5/8$

(i) $2/3$

(j) 0

(k) $1/5$

(l) None of these

$$|\mathcal{S}| = 2^3 = 8$$

$$E = \{HHT, HTH, THH, HHH\}$$

$$F = \{HHH\}$$

$$P(F|E) = \frac{P(F \cap E)}{P(E)} = \frac{\frac{1}{8}}{\frac{1}{2}} = \left(\frac{1}{4}\right)$$

Suppose A, B, C are events in sample space S , where A and C are disjoint. The following probabilities are known: $P(A) = 1/8$, $P(B) = 5/12$, $P(C) = 5/8$, $P(AB) = 1/24$, $P(BC) = 1/4$. What is the probability that neither A nor B nor C occur?

(a) 1/8

$$AC = \emptyset \rightarrow ABC = \emptyset$$

(b) 0

$$P(A \cup B \cup C)^\complement ?$$

(c) 1/24

(d) 1

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - (P(AB) + P(BC) + P(AC)) + P(ABC)$$

(e) 1/3

(f) 1/12

$$= \frac{1}{8} + \frac{5}{12} + \frac{5}{8} - \left(\frac{1}{24} + \frac{1}{4} + 0 \right) + 0$$

(g) 5/24

(h) 1/6

→ calculator

(i) 1/4

(j) 5/12

$$= \frac{7}{8}$$

(k) 3/8

(l) None of these

$$P(A \cup B \cup C)^\complement = 1 - \frac{7}{8} = \left(\frac{1}{8} \right)$$

Suppose a sample space $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ has equiprobable outcomes. Which one of the following events is independent of the event $\{2, 8\}$?

(a) $\{1, 3, 5, 8, 9\}$

$$|S| = 10$$

(b) $\{2, 4, 5, 8\}$

$$P(E) = \frac{1}{5}$$

(c) $\{1, 3, 5, 7, 9\}$

$$E \perp\!\!\!\perp F \iff P(EF) = P(E)P(F)$$

(d) $\{1, 5, 9\}$

(e) $\{3, 6, 7, 9\}$

(f) $\{3, 5, 6, 7, 9\}$

$$\frac{|EF|}{10} = \frac{1}{5} \cdot \frac{|F|}{10}$$

(g) $\{1, 4, 6, 7\}$

$$5|EF| = |F| \rightarrow \frac{1}{5} = \frac{|EF|}{|F|}$$

(h) $\{4\}$

$|F|$ mult. of 5

(i) $\{4, 5\}$

5 x member of B in A

(j) $\{1, 3, 4, 5, 6, 7, 9\}$

$\{1, 3, 5, 8, 9\}$

(k) $\{9\}$

(l) None of these