

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

$$|S| = 2^3 = 8$$

$$E = \{HHH, HTH, TTH, HHH\}$$

$$F = \{HHH\}$$

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

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)  $1/8$

$$AC = \phi \rightarrow ABC = \phi$$

(b)  $0$

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

(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)  $1/6$

$\rightarrow$  calculator

(i)  $1/4$

(j)  $5/12$

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

(k)  $3/8$

(l) None of these

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

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

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

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

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

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

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

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

(h)  ~~$\{4\}$~~

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

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

(k)  ~~$\{9\}$~~

(l) None of these

$$|S| = 10$$

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

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

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

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

$|F|$  mult. of 5

5x memba of B in A

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