Suppose an experiment has sample space $S = \{a, b, c, d, e, f\}$ and define the events $U = \{a, b, d, e\}$, $V = \{c, e, f\}$, and $W = \{a, e\}$. If $P(U) + P(V) = 7/5$ and $P(W) = 1/2$, then what is $P(\{a\})$ ?

(a) 1/10

(b) 1/5

(c) 1/20

(d) 2/5

(e) 3/10

(f) 1/2

(g) 0

(h) 3/10

(i) 3/20

(j) 3/5

(k) 1/6

(l) None of these

Suppose $A$, $B$, and $C$ are three events in the sample space of an experiment such that

$$\begin{aligned} P(A \cup B \cup C) &= 0.9 \\ P(A \cup B) &= 0.7 \\ P(AB^cC^c) &= 0.4 \\ P(ABC) &= 0.25 \end{aligned}$$

What is the probability of the union of the events $A^cB^cC$ and $A^cB^cC^c$ ?

(a) 0.3

(b) 0.1

(c) 0.2

(d) 0.4

(e) 0.5

(f) 0.6

(g) 0.7

(h) 0.15

(i) 0.75

(j) 0.35

(k) 0.65

(l) None of these

Suppose an experiment has an infinite sample space $S = \{a_1, a_2, a_3, \dots\}$ where $P(a_k) = 2^{-k}$ for each $k = 1, 2, 3, \dots$. For each $k$, define the infinite event $E_k = \{a_k, a_{k+1}, a_{k+2}, \dots\}$. What is the probability that the events $E_2$ and $E_4^c$ both occur?

(a) 3/8

(b) 5/8

(c) 1/2

(d) 1/8

(e) 1/4

(f) 3/4

(g) 1/16

(h) 3/16

(i) 0

(j) 5/16

(k) 2/3

(l) None of these