

Q.1 Three biscuit making machines A, B and C are installed in a factory. Machine A makes **35%** of the biscuits, machine B makes **28%** of the biscuits and rest of the biscuits are made by machine C. It is found that **4%** of the biscuits made by machine A are broken, **1%** of the biscuits made by machine B are broken and **9%** of the biscuits made by machine C are broken. Select a biscuit at random. Given that the biscuit is broken, what is the probability that it is NOT made by machine A?

Max. score: 1.5; Neg. score: 0; Your score: 1.5

- ☒ ☐ 0.721
☐ 0.333
☐ 0.279
☐ 0.673

Q.2 Consider two coins, one is unbiased and the other is biased. For the biased coin, probability of getting heads in a single toss is x with $x \in (0, 1)$. Both these coins are tossed twice, and all the tosses are independent. If the probability of getting exactly one head (out of the four tosses) **0.45**, then which of the following statement(s) is (are) correct.

Max. score: 1.5; Neg. score: 0; Your score: 1.5

- ☒ ☐ $x < 0.2$
☐ $x > 0.1$
☐ $0.2 < x < 0.5$
☐ $x > 0.2$
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Q.3 Two fair dice are rolled. Let X and Y be the outcome of the first die and the second die, respectively. Then, which of the following statement(s) is (are) true.

Max. score: 1.5; Neg. score: 0; Your score: 1.5

- ☒ ☐ $P(|X + Y| = \text{a multiple of } |X - Y|) = \frac{11}{18}$
☐ $P(|X + Y| = \text{a multiple of } |X - Y|) = \frac{13}{18}$
☒ $P(X + Y = \text{an odd number}) = \frac{1}{2}$
☐ $P(X + Y = \text{an odd number}) = \frac{5}{12}$

Q.4 Let A and B be two events such that $P(A) = 0.8, P(B) = 0.5$ and $P(A \cup B) = 0.85$. Then, which of the following statement(s) is (are) true.

Max. score: 1; Neg. score: 0; Your score: 0

- ☒ ☐ $P(A^c | B) = 0.1$
☐ $P(A^c | B) = 0.15$
☐ A^c and B are independent
☒ A^c and B are NOT independent

Q.5 Fix $0 < x < \frac{1}{6}$. Consider a bag containing balls numbered $\{1, 2, \dots, 6\}$. Let A_i denote the event of drawing the ball numbered i , with $P(A_1) = \frac{1}{6} + x, P(A_6) = \frac{1}{6} - x$ and $P(A_i) = \frac{1}{6}$ for $i \in \{2, 3, 4, 5\}$. Two balls are drawn with replacement from the bag, and their numbers are noted. If $P(\text{sum of the two numbers is } 7) = \frac{11}{75}$, then what is the value of x ?

Max. score: 1; Neg. score: 0; Your score: 1

- ☒ ☐ $\frac{1}{10}$
☐ $\frac{1}{11}$
☐ $\frac{1}{8}$
☐ $\frac{1}{12}$

Q.6 The coefficients of a quadratic equation $ax^2 + bx + c = 0$ are determined by choosing numbers randomly (without replacement) from the set $\{2, 3, 4, 6\}$. Then, what is the probability that this equation has real roots?

Max. score: 1.5; Neg. score: 0; Your score: 1.5

- ☐ $\frac{1}{12}$
- ☐ $\frac{1}{8}$
- ☒ $\frac{1}{6}$
- ☐ $\frac{5}{24}$

Q.7 Let A and B be two events such that $P(A) = 0.5$ and $P(B) = 0.7$. Then, which of the following statement(s) is (are) correct.

Max. score: 1; Neg. score: 0; Your score: 0

- ☒ ☐ $P(B | A) \geq \frac{1}{4}$
- ☐ $P(A | B) \geq \frac{2}{5}$
- ☒ ☒ $P(B | A) \geq \frac{2}{5}$
- ☒ ☒ $P(A | B) \geq \frac{2}{7}$

Q.8 In a regular polygon of 14 sides, three vertices are chosen at random. What is the probability that a triangle formed using these vertices is a right-angled triangle?

Max. score: 1; Neg. score: 0; Your score: 1

- ☐ $\frac{3}{26}$
- ☐ $\frac{5}{13}$
- ☒ ☒ $\frac{3}{13}$
- ☐ $\frac{5}{26}$