

Probability – From Classical to Quantum Quiz

Question 1

Which of the following statements best describes the general concept of probability?

- A. A probability is a value greater than 1.
- B. A probability indicates how likely an event is to occur. It is a number between 0 and 1.
- C. A probability calculates an outcome.
- D. Probability is a concept which is exclusive to quantum physics.

Question 2

An event E is best described as:

- A. A single outcome from the sample space
- B. A collection of outcomes (a subset of the sample space)
- C. The total number of possible outcomes
- D. An outcome that always has a probability of 1

Question 3

If the event E is “rolling a 4 on a fair die”, then “not E ” (the complement of E) is:

- A. Rolling a 4 or a 5
- B. Rolling a 3 or 6
- C. Rolling any outcome other than 4
- D. Rolling an even number

Question 4

When rolling a six-sided die, why is $p(\text{even number}) = 0.5$?

- A. Because there are exactly three even faces (2, 4, 6) out of six total faces.
- B. Because each face has a 50% chance of appearing.
- C. Because rolling a die always yields half evens and half odds by law.
- D. Because 6 is an even number.

Question 5

A bag contains 8 red marbles, 5 blue marbles and 7 green marbles. Draw one marble at random. What is the probability of drawing a blue marble?

- A. 33%
- B. 75%
- C. 25%
- D. 50%

Question 6

A quantum physical system (e.g. a qubit) can be described by the state $|\psi\rangle = \alpha |0\rangle + \beta |1\rangle$. Which statement is correct?

- A. α and β must both be real numbers between 0 and 1.
- B. α and β can be any complex numbers, provided their squared magnitudes sum up to 1.
- C. α and β must sum up to 1.
- D. α must be smaller than β .