 Identifying binomial random variables

Consider a list of random experiments and determine if the random variable in each is distributed binomially. Where it is binomial, determine the values for and and write the information using the notation . Where it is not binomial, explain why it is not.

Examples

1. 31% of Australians have a Bachelor degree or above. From a random sample of 100 Australians, is the number who have a Bachelor degree or above.
2. A fair coin is flipped 12 times, and students need to calculate the probability that exactly two heads are obtained.
3. A fair coin is flipped 20 times. represents the number of heads.
4. A fair die is rolled 50 times. represents the number of times you get a six.
5. A fair die is rolled repeatedly. is the number of rolls it takes to get a six.
6. Three cards are drawn from a pack of four cards containing one club, one diamond, one spade and one heart. They are drawn one after the other without replacement. is the number of diamonds selected.
7. Three cards are drawn from a pack of four cards containing one club, one diamond, one spade and one heart. They are drawn one after the other with replacement. is the number of diamonds selected.
8. Approximately 1 in every 20 children has a specified illness. is the number of children with the illness out of a random sample of 100 children. It is assumed we are sampling from such a vast population that the selections are virtually independent.
9. The probability of having blood type B is 0.1. Choose 4 people at random. is the number with blood type B.
10. A student answers 10 quiz questions completely at random. The first five are true/false answers, and the second five are multiple choice, with four options each. represents the number of correct answers.

Solutions

1. Yes, or
2. No random variable is identified. If was the number of heads obtained, then the binomial distribution could be defined i.e. or
3. Yes, or
4. Yes,
5. No. You are not given the number of trials.
6. No. The cards are not replaced, which means the events are not independent.
7. Yes, or
8. Yes, or
9. Yes,
10. No, the value of changes between the first 5 and last 5 questions.