TEBIBU KEBEDE

1

(a) Sample Space S

The sample space S in this experiment consists of all possible outcomes when rolling a pair of dice, one green and one red. Since each die has 6 faces, the total number of outcomes is 6×6=366×6=36. The sample space is represented as pairs (x,y), where x is the outcome on the green die and y is the outcome on the red die.

Sample Space S:
={(1,1),(1,2),(1,3),(1,4),(1,5),(1,6),(2,1),(2,2),…,(6,5),(6,6)}S={(1,1),(1,2),(1,3),(1,4),(1,5),(1,6),(2,1),(2,2),…,(6,5),(6,6)}

(b) Event A: Sum Greater than 8

Event A:
={(3,6),(4,5),(4,6),(5,4),(5,5),(5,6),(6,3),(6,4),(6,5),(6,6)}A={(3,6),(4,5),(4,6),(5,4),(5,5),(5,6),(6,3),(6,4),(6,5),(6,6)}

(c) Event B: A 2 on Either Die

Event B:
={(1,2),(2,1),(2,2),(2,3),(2,4),(2,5),(2,6),(3,2),(4,2),(5,2),(6,2)}B={(1,2),(2,1),(2,2),(2,3),(2,4),(2,5),(2,6),(3,2),(4,2),(5,2),(6,2)}

(d) Event C: Number Greater than 4 on Green Die

Event C:
={(5,1),(5,2),(5,3),(5,4),(5,5),(5,6),(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)}C={(5,1),(5,2),(5,3),(5,4),(5,5),(5,6),(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)}

(e) Event A∩C: Intersection of A and C

Event A∩C:
={(5,4),(5,5),(5,6),(6,3),(6,4),(6,5),(6,6)}A∩C={(5,4),(5,5),(5,6),(6,3),(6,4),(6,5),(6,6)}

(f) Event A∩B: Intersection of A and B

Event A∩B: ={(4,6),(5,5),(5,6),(6,2),(6,5),(6,6)}A∩B={(4,6),(5,5),(5,6),(6,2),(6,5),(6,6)}

(g) Event B∩C: Intersection of B and C

Event B∩C: $=\{(5,2),(6,2)\}B\cap C=\{(5,2),(6,2)\}$

2. (a) No Mechanical Problems (M), No Ticket (T), Campsite with No Vacancies (V)

This would be the area that is only in the V circle and not in M or T.

Region: 8

(b) Mechanical Problems (M) and Trouble Finding Campsite (V), No Ticket (T)

This would be the area where M and V circles overlap but not T.

Region: 6

(c) Either Mechanical Trouble (M) or No Vacancies (V), No Ticket (T)

This would be all the areas in circles M and V that do not overlap with T. This includes the exclusive parts of M and V, and their intersection.

Regions: 2, 6, 8

(d) Will Arrive at a Campsite with Vacancies

This includes all the regions outside of V.

Regions: 1, 2, 3, 4, 5, 7

These are the regions of the Venn diagram that correspond to the given events.

3.

(a) Number of Ways to Line Up 6 People

There are 720 ways to line up 6 people to get on a bus.

(b) If 3 Specific Persons Insist on Following Each Other

If 3 specific persons insist on following each other, there are 144 possible ways to arrange them along with the other 3 people.

(c) If 2 Specific Persons Refuse to Follow Each Other

If 2 specific persons refuse to follow each other, there are 480 possible ways to arrange all 6 people.

4.

(a) Arranging 8 Covered Wagons in a Circle

There are 5,040 ways to arrange 8 covered wagons from Arizona in a circle.

(b) Arranging Trees Along a Property Line

There are 1,260 ways to arrange 3 oaks, 4 pines, and 2 maples along a property line without distinguishing among trees of the same kind.

5.

(a) Unique Poker Hands

The number of unique poker hands that can be drawn from a standard 52-card deck is given by the combination formula:

Combinations=!Combinations=(rn)=r!(n−r)!n!

Where n is the total number of items to choose from, in this case, 52 cards, and r is the number of items to choose, in this case, 5 cards for a poker hand.

Unique Poker Hands=(525)Unique Poker Hands=(552)

There are 2,598,960 unique poker hands that one can draw from a standard 52-card deck.

(b) Full House

A full house consists of three cards of one rank and two cards of another rank. There are 13 ranks and 4 cards of each rank. To choose a full house:

1. Choose the rank for the three of a kind (13 options).
2. Choose 3 out of the 4 cards from this rank ((43)(34) ways).
3. Choose the rank for the pair (12 remaining options).
4. Choose 2 out of the 4 cards from this second rank ((42)(24) ways).

The total number of ways to get a full house is the product of these choices.

There are 3,744 different ways to have a full house in a poker hand.

(c) Three of a Kind

For a three of a kind hand (not a full house), you must:

1. Choose the rank for the three of a kind (13 options).
2. Choose 3 out of the 4 cards from this rank ((43)(34) ways).
3. Choose ranks for the two single cards (from the remaining 12 ranks, this is (122)(212) ways).
4. For each of these two chosen ranks, select one card ((41)×(41)(14)×(14) ways).

The total number of ways to get a three of a kind hand is the product of these choices.

There are 54,912 different ways to have a three of a kind in a poker hand, where the other two cards do not form a pair.