Repeated Experiments

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Problem Sets due Jun 1, 2022 17:13 +03

Part 1

times the same thing minus one,

because you cannot select the same element twice.

Okay and this concludes part one

and what we want to do next is talk about part two,

which is what happens when the order matters

or does not matter.

See you then.

End of transcript. Skip to the start.

Part 2

So there's no issue in that, and everything else

also the same probability.

So what are we going to do next time?

We're going to start applying what we

have been learning to games of chess.

See you then.

End of transcript. Skip to the start.

5.4a_Probability_Repeated_Experiments

5.4b_Probability_Repeated_Experiments

POLL

Which of the following are independent repetitive experiments?

RESULTS

card draws with replacement	**74%**
card draws without replacement	**13%**

card draws without replacement 13%

neither 13%

Submit

Results gathered from 23 respondents.

FEEDBACK
Card draws with replacement will be independent repetitive experiments.

1

0 points possible (ungraded)
You have two fair coins. If you flip a head with the first coin, what is the probability of flipping a head with the second?

- 1
- 0
- $\frac{1}{2}$
- $\frac{1}{4}$

Explanation
Flipping the first and the second coin are independent.

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

2 (Graded)

1/1 point (graded)
A bag has 3 red and 3 green apples. You start by randomly selecting one red apple from the bag. Which of the following has the highest probability?

- Select another red apple after replacing the first.
- Select another red apple without replacing the first.
- Select a green apple after replacing the first red apple.
- Select a green apple without replacing the first red apple.

Explanation
- After replacement, there are 3 green and 3 red apples. The probability to select a red one is $\frac{1}{2}$.
- Withtout replacement, there are 3 green and 2 red apples. The probability to select a red one is $\frac{2}{5}$.
- After replacement, there are 3 green and 3 red apples. The probability to select a red one is $\frac{1}{2}$.
- Without replacement, there are 3 green and 2 red apples. The probability to select a red one is $\frac{3}{5}$.

Submit You have used 2 of 2 attempts

Answers are displayed within the problem

3

0 points possible (ungraded)

Roll two fair and distinguishable six-sided dice. What is the probability that the outcome of the second die is strictly greater than the the first?

5/12 ✔ **Answer:** 5/12

$\frac{5}{12}$

Explanation

The outcomes that give rise to this event are $(1,2), (1,3), \ldots, (1,6)$, $(2,3), (2,4), \ldots, (2,6)$, $(3,4), \ldots, (3,6)$, $(4,5), (4,6), (5,6)$, where in each ordered pair, the numbers correspond to the first and second die respectively. It can be easily verified that there are 15 such outcomes, each of probability $1/36$, thus $15 \times 1/36 = 5/12$.

Submit You have used 1 of 4 attempts

Answers are displayed within the problem

4 (Graded)

3/3 points (graded)

5 Engineers and 3 artists align at random along line. What is the probability that the first and last are Engineers?

- 3/14
- 8/16
- 9/14
- 5/14 ✔

Explanation

The 5 engineers and 3 artists can line up in $\binom{8}{3}$ ways, each corresponding to one choice of the the 3 artist locations out of the total 8. Note that all these arrangments are equaly likely, hence this space is uniform.
If the first and last are engineers, then there are 6 locations left, and the number of ways to coose the locations of the artists is $\binom{6}{3}$.
Hence the probability that the first and last are engineers is
$\frac{\binom{6}{3}}{\binom{8}{3}} = \frac{6 \cdot 5 \cdot 4}{8 \cdot 7 \cdot 6} = \frac{5}{14}$.
In the sequential probability section we will see an easier way to find the answer.

Submit You have used 1 of 2 attempts

Answers are displayed within the problem

5

0 points possible (ungraded)

Which of the following are distributed uniformly when rolling two fair dice?

- [x] The outcome (number) of the first die, e.g., "4", or "6",
- [x] The ordered pair of outcomes, e.g., $(1,3)$, $(3,1)$, or $(6,6)$,
- [ ] The unordered pair of outcomes, e.g., $\{1,3\}$ or $\{6,6\}$,
- [ ] the difference between the first and second outcomes, e.g. $(1,3) \to -2$,
- [x] the difference between the first and second outcomes mod 6, e.g. $(1,3) \to (-2)_6 = 4$,
- [ ] The absolute value of difference$(1,3) \to |1-3| = 2$,
- [x] The lower of the two outcomes, e.g. $(1,3) \to 1$,
- [x] the sum of the two outcomes, e.g. $(1,3) \to 4$.

✖

Explanation

- True.
- True.
- False. $P(\{1,3\}) = \frac{2}{36} \neq P(\{6,6\}) = \frac{1}{36}$.
- False. $P(\text{difference is } 0) = \frac{6}{36} \neq P(\text{difference is } 1) = \frac{5}{36}$.
- True.
- False. $P(\text{absolute difference is } 0) = \frac{6}{36} \neq P(\text{absolute difference is } 1) = \frac{10}{36}$.
- False. $P(\text{minimum is } 1) = \frac{11}{36} \neq P(\text{minimum is } 2) = \frac{9}{36}$.
- False. $P(\text{sum is } 2) = \frac{1}{36} \neq P(\text{sum is } 3) = \frac{2}{36}$.

Submit You have used 3 of 3 attempts

Answers are displayed within the problem

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