SAMPLE SPACES HOMEWORK

TEXT: 3.1

LAST NAME	FIRST NAME	DATE

1. An experiment consists of buying a carton of 12 eggs and counting how many of them are cracked. Describe the sample space.

2. Describe the sample space for the experiment where we shuffle a deck of 3 playing cards: and Ace, a King, and a Queen, and then lay them out in a sequence.

3. Toss a fair coin 13 times and record the sequence of Heads and Tails. How large is this sample space?

Suppose that you have five cards, labeled 1, 2, 3, 4, and 5. After shuffling them well, you choose two of these cards at random.

4. How many outcomes are in the sample space for this experiment?

5. What are the chances that the number on one card is twice the number on the other card?

6. How likely are the two cards to add up to 5?

An experiment consists in choosing a random day of the week (Mon, Tue, Wed, Thu, Fri, Sat, or Sun) and a random time of day (morning, afternoon, or evening), so that every choice is equally likely.

7. Construct the sample space for this experiment. What is the size of this sample space?

8. Find the probability that the chosen time is in the afternoon.

9. Find the probability that the chosen time is not on Wednesday.

10. Find the probability that the chosen time is either on Monday, or in the morning.

11. Find the probability that the chosen time is during a weekend (Saturday or Sunday) and not in the evening.

Toss two fair six-sided dice, one blue and the other one red. Each die will show a random integer between from 1 to 6. Define some events for this experiment:

$F =$ the sum of the two dice is 4.
$T =$ one or the other die shows 3.
$D =$ the dice show different numbers.
$E =$ both dice show even numbers.

12. What is the size of the sample space?

13. Find $P(F)$.

14. Find $P(T)$.

15. Find $P(D)$.

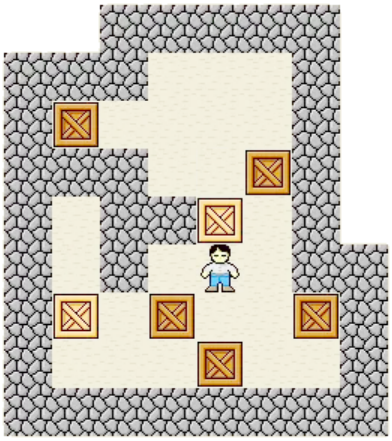
16. Find $P(E)$.

17. Are the events D and E mutually exclusive? Explain.

18. Are the events E and T mutually exclusive? Explain.

A character in a video game moves along a rectangular grid in discrete turns. In one turn, it has to move either up, down, left, or right, and step into one of the four adjacent grid tiles, unless it's blocked by a wall or something heavy. A character has to move, and cannot opt to stand still. A character can push one box as long as there's nothing behind it.

An outcome of the character's movements is the state of the maze, so two outcomes are different if the positions of either the character or any of the boxes are different.



19. What is the size of the sample space after the character makes one move?

20. What is the size of the sample space after the character makes two moves?

Imagine that the same character is starting out on an empty grid, no walls or boxes anywhere.

21. What is the size of the sample space after 2 moves?

22. What is the size of the sample space after 10 moves?

ANSWERS

1. $S = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$, $|S| = 13$

3. 8192

5. 0.2

7. The size of this sample space is 21, and it consists of every possible pair with a day of the week a and a time of day: Mon morning, Mon afternoon, Mon evening, Tue morning, ...

9. 6/7

11. 4/21

13. 1/12

15. 5/6

17. No: they have outcomes in common, like $(2, 4)$