Compute the mean and standard deviation of the random variable with the given discrete probability distribution.

x	$P(x)$
-2	0.1
2	0.26
3	0.28
4	0.14
7	0.22

Send data to Excel

Part 1 of 2

(a) Find the mean. Round the answer to three decimal places, if necessary.

The mean is 3.26.

Part 2 of 2

(b) Find the standard deviation. Round the answer to three decimal places, if necessary.

The standard deviation is 2.5204.

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Fill in the missing value so that the following table represents a probability distribution.

x	35	45	55	65	75
$P(x)$	0.15	0.4	0.15	0.25	0.05

Dirty air: The federal government has enacted maximum allowable standards for air pollutants such as ozone. Let X be the number of days per year that the level of air pollution exceeds the standard in a certain city. The probability distribution of X is given by

x	0	1	2	3	4
$P(x)$	0.35	0.40	0.18	0.04	0.03

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Part 1 of 4

(a) Find $P(3)$.

$P(3) =$ 0.04

Part 2 of 4

(b) Find $P(2 \text{ or fewer})$.

$P(2 \text{ or fewer}) =$ 0.93

Part 3 of 4

(c) Find the probability that the standard is exceeded on at least three days.

The probability that the standard is exceeded on at least three days is 0.07.

Part: **4 / 4**

Part 4 of 4

(d) Find the probability that the standard is exceeded on more than one day.

The probability that the standard is exceeded on more than one day is 0.25.

Dirty air: The federal government has enacted maximum allowable standards for air pollutants such as ozone. Let X be the number of days per year that the level of air pollution exceeds the standard in a certain city. The probability distribution of X is given by

x	0	1	2	3	4
$P(x)$	0.34	0.35	0.19	0.08	0.04

Part 1 of 2

(a) Compute the mean μ_X. Round the answer to three decimal places as needed.

$\mu_X =$ 1.13

Part: **2 / 2**

Part 2 of 2

(b) Compute the standard deviation σ_X. Round the answer to three decimal places as needed.

$\sigma_X =$ 1.092

School days: The following table presents the numbers of students enrolled in grades 1 through 8 in public schools in a certain country.

Grade	Frequency (in 1000s)
1	3796
2	3600
3	3611
4	3628
5	3574
6	3693
7	3705
8	3798
Total	29,405

Send data to Excel

Consider these students to be a population. Let X be the grade of a student randomly chosen from this population.

Part 1 of 3

(a) Construct the probability distribution of X. Round the answers to three decimal places.

x	1	2	3	4	5	6	7	8
$P(x)$	0.129	0.122	0.123	0.123	0.122	0.126	0.126	0.129

Part 2 of 3

(b) Find the probability that the student is in seventh grade.

The probability that the student is in seventh grade is 0.126.

Part: 3 / 3

Part 3 of 3

(b) Find the probability that the student is in seventh or eighth grade.

The probability that the student is in seventh or eighth grade is 0.255.

Lottery: In the New York State Numbers Lottery, you pay $1 and pick a number from 000 to 999. If your number comes up, you win $450, which is a profit of $449. If you lose, you lose $1. Your probability of winning is 0.001.

Part 1 of 2

(a) What is the expected value of your profit? Round the answer to two decimal places.

The expected value of profit is -0.55.

Part: **2 / 2**

Part 2 of 2

(b) Is it an expected gain or an expected loss? Round the answer to two decimal places.

This is an expected loss ▼ of $ 0.55.

Craps: In the game of craps, a pair of dice are rolled, and people bet on the outcome. For example, you can bet $1 that the sum of the dice will be 11 (also called "Yo-leven"). The probability that you win is $\frac{1}{18}$, and if you win, your profit is $15. If you lose, you lose $1.

Part 1 of 2

(a) What is the expected value of your profit? Round the answer to two decimal places.

The expected value of profit is -0.11 dollars.

Part: **2 / 2**

Part 2 of 2

(b) Is it an expected gain or an expected loss? Round the answer to two decimal places.

This is an expected loss ▼ of $ 0.11.

Standardized Test: You are trying to answer a multiple choice question on a standardized test. There are three choices. If you get the question right, you gain one point, and if you get it wrong, you lose $\frac{1}{2}$ point. Assume you have no idea what the right answer is, so you pick one of the choices at random. What is the expected value of the number of points you get?

What is the expected value of the number of points you get? Round the answer to two decimal places.

The expected value of the number of points you get is 0.

Lottery: In the New York State Numbers Lottery, you pay $1 and pick a number from 000 to 999. If your number comes up, you win $450, which is a profit of $449. If you lose, you lose $1. Your probability of winning is 0.001.

Part 1 of 2

(a) What is the expected value of your profit? Round the answer to two decimal places.

Example

SAMPLE QUESTION

Lottery: In the New York State Numbers Lottery, you pay $1 and pick a number from 000 to 999. If your number comes up, you win $800, which is a profit of $799. If you lose, you lose $1. Your probability of winning is 0.001.

(a) What is the expected value of your profit?

(b) Is it an expected gain or an expected loss?

EXPLANATION

(a) What is the expected value of your profit?

Let X represent the profit in dollars. The possible values of X are -1 and 799. You either lose $1 or gain $799. The probability of winning is 0.001 and the probability of losing is $1-0.001=0.999$.

The probability distribution of X is therefore

x	-1	799
$P(x)$	0.999	0.001

The expected value is the mean of X:

$$\mu_x=(-1)\cdot(0.999)+799\cdot(0.001)=-0.20$$

(b) Is it an expected gain or an expected loss?

The expected value is negative, so this is an expected loss of $0.20.

ANSWER

Part 1 of 2

The expected value of profit is -0.20.

Part 2 of 2

This is an expected loss ▼ of $ 0.20.

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Craps: In the game of craps, a pair of dice are rolled, and people bet on the outcome. For example, you can bet $\$1$ that the sum of the dice will be 11 (also called "Yo-leven"). The probability that you win is $\frac{1}{18}$, and if you win, your profit is $\$15$. If you lose, you lose $\$1$.

Part 1 of 2

Example

SAMPLE QUESTION

Craps: In the game of craps, a pair of dice are rolled, and people bet on the outcome. For example, you can bet $\$1$ that the sum of the dice will be 3 (also called "Ace Deuce"). The probability that you win is $\frac{1}{18}$, and if you win, your profit is $\$15$. If you lose, you lose $\$1$.

EXPLANATION

(a) What is the expected value of your profit?

Let X represent the profit in dollars. The possible values of X are -1 and 15. You either lose $\$1$ or gain $\$15$. The probability of winning is $\frac{1}{18}$ and the probability of losing is $1-\frac{1}{18}=\frac{17}{18}$.

The probability distribution of X is therefore

x	-1	15
$P(x)$	$\frac{17}{18}$	$\frac{1}{18}$

The expected value is the mean of X:

$$\mu_X=-1\left(\frac{17}{18}\right)+15\left(\frac{1}{18}\right)=-0.11$$

(b) Is it an expected gain or an expected loss?

The expected value is negative, so this is an expected loss of $\$0.11$.

ANSWER

Part 1 of 2

-0.11

Part 2 of 2

This is an expected loss of $\$0.11$.

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