

Discrete Random Variables

- Topics: Mean (expected value) of a discrete random variable
- Objective: Students will be able to calculate mean expected value given a probability distribution.
- Standards: AP Stats: VAR-5 (EU), VAR-5.C (LO), VAR-5.C.1 (EK), VAR-5.C.2 (EK), VAR-5.D (LO), VAR-5.D.1 (EK)

Mean (expected value) of a discrete random variable

Definition: The ***Expected Value*** is the mean of a random variable. A quantity equal to the average result of an experiment after a large number of trials.

This is the same as regular Expected Value, you will need to determine which variable you are using.

NOTE: This may look intimidating, but it is not that difficult.

Mean (expected value) of a discrete random variable

Example 1: Elena loves to go fishing. Each time she catches a fish, there is a 70% chance that it is a northern pike and a 30% chance it is a walleye. Let X be the random variable that represents the number of northern pike Elena gets if she catches 2 fish.

Find the expected value of the number of northern pike Elena catches.

$$E(X) = \boxed{1.4} \text{ northern pike}$$

$X = \# \text{ of pike}$	0	1	2
$P(X)$	0.09	0.42	0.49

$$(0 \times 0.09) + (1 \times 0.42) + (2 \times 0.49)$$
$$0 + 0.42 + 0.98$$

Mean (expected value) of a discrete random variable

Example 2: Kelsie works at a bicycle shop as a salesperson. She records the number of bicycles she sells on a daily basis. Here is the probability distribution of B, equals the number of bicycles Kelsie sells on a randomly selected day, and T, equals the time she spends filling out daily sales reports.

Calculate the mean of B.

$\mu_B =$ bicycles

$\mu = \text{mean}$

μ_T

$B = \# \text{ of bicycles sold}$	0	1	2	3
$T = \text{time (minutes)}$	10	20	30	40
Probability	0.30	0.50	0.15	0.05

$$(0 * .30) + (1 * .50) + (2 * .15) + (3 * .05)$$

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Example 3: Jordan wants to play a basketball game at a carnival. The game costs the player \$5 to play, and the player gets to take two long-distance shots.

If they miss both shots, they get nothing. If they make one shot, they get their \$5 back. If they make both shots, they get \$10 back. Jordan has a 40% chance of making this type of shot.

Here is the probability distribution of X , equals the number of shots Jordan makes in a randomly selected game, and M , equals the amount of money Jordan gains from playing the game.

Find the expected value of the amount of money Jordan gains from playing this game.

$E(M) =$ dollars

X = # of shots made	0	1	2
M = money gained	-\$5	\$0	\$5
Probability	0.36	0.48	0.16

$$(-5 * .36) + (0 * .48) + (5 * .16)$$

You should be working on the following skills:

1. Expected Value
2. Mean (expected value) of a discrete random variable