Learning Intentions

- To learn how to calculate the expected value of an experiment.

Notes

1. The expected value is:

2. The expected value is calculated by:

3. Mr. Renwick rolls a fair 6-sided die. If he rolls a 4 or less, he receives no prize. If he rolls a 5 or more, he receives $10. What is the expected value from rolling the die once?

4. A lottery has 2,000 tickets. There is a $1,000,000 grand prize, and 5 $5,000 prizes. What is the expected value from buying a ticket?

5. There is a weighted die that has a 1/10 chance of landing on 1 or 2, a 1/5 chance of landing on 3 or 4, a 2/5 chance of landing on 5, and a 0% chance of landing on 6. A carnival game is played where you receive $10 times the number that appears on the die.

    a. What is the expected value of the game?

    b. How much should the carnival charge to play the game?

Questions

For all of the following questions, assume that it is the first round of Yahtzee and so all of the scoring categories are available.

1. After the second roll, you have 6 6 6 6 1. You decide to roll the 1 for your last roll. What is the expected value of your hand?

2. After the second roll, you have 1 1 2 3 4. You decide to roll one of the 1's for your last roll. What is the expected value of your hand?

3. After the second roll, you have 3 3 4 5 6. You decide to roll one of the 3's for your last roll. What is the expected value of your hand?

4. After the second roll, you have 2 3 4 5 5. You decide to roll one of the 5's for your last roll. What is the expected value of your hand?

5. Of the previous 3 hands, which has the highest expected value? Why?

6. After the second roll, you have 1 2 4 4 4. You decide to roll the 1 for your last roll, going for a full house. What is the expected value of your hand?

7. After the second roll, you have 1 2 4 4 4. You decide to roll the 1 and 2 for your last roll, going for a full house. What is the expected value of your hand?

8. Of the previous 2 hands, which has the highest expected value? Why?

Answers

1. 30.83 points

2. 31.67 points

3. 31.67 points

4. 33.3 points

5. 2 3 4 5 5

6. 19 points

7. 20.7 points

8. Rolling 1 and 2, because you can roll a Yahtzee.