Time Frame: 50 minutes

Subject Matter: Discrete Probability Distribution TELL ME

Objective: TSWBAT Find the expected value for a discrete random variable.

Standards: DA – 5.11

 Materials: Transparencies and Worksheets

SHOW ME

Presentation of Information:

The teacher will discuss the following:

* Expected Value

The expected value of a discrete random variable of a probability distribution is the theoretical average of the variable. The formula is

$$μ=E\left(x\right)= ΣX∙P(X)$$

* + This can be used in various types of games of chance, in insurance, and in other areas, such as decision theory.

Example (from homework)

If a player rolls two dice and gets a sum of 2 or 12, she wins $20. If the person gets a 7, she wins $5. The cost to play the game is $3. Find the expectation of the game.

Solution:

Sum of 2 or 12: (1,1), (6,6) Sum of 7: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1)

Outcome X ­­­ $17 $2\_\_-$3\_­­

Probability P(X) $\frac{2}{36}$ $\frac{6}{36}$ $\frac{28}{36}$

$$E\left(X\right)=\$17∙\frac{2}{36}+ \$2∙\frac{6}{36}+-\$3∙\frac{28}{36}$$

$E\left(X\right)=-\$1.06$ Answer

Let Me Try

1. A lottery offers one $1,000 prize, one $500 prize, and five $100 prizes. One thousand tickets are sold at $3 each. Find the expectation when a person buys one ticket.
2. For a daily lottery, a person selects a three-digit number. If the person plays for $1, she can win $500. Find the expectation. In the same daily lottery, if a person boxes a number, she will win $80. Find the expectation if the number 123 is played for $1 and boxed. (when a number is “boxed,” it can win when the digits occur in any order.
3. If a 60-year-old buys a life insurance policy at a cost of $60 and has a probability of 0.972 of living to age 61, find the expectation of the policy.

Homework:

One thousand tickets are sold at $1 each for a color TV valued at $350. What is the expected value of the gain if a person purchases one ticket?