

CHAPTER 15: RANDOM VARIABLES

Random Variables: variables that assume different values as result of _____ →

- specific values of random variables →
- Discrete Random Variable: a random variable that can take 1 of a finite number of _____ outcomes
- Continuous Random Variable: a random variable that can take _____ value within a range of values. The range can be infinite or bounded

Probability Model: collection of all possible _____ & the _____ they occur.

Variable	Result (x)	Probability	Expected	Deviation

Expected Value: The theoretical long-run average value. The _____ of the probability model

$$E(x) = \mu: \underline{\hspace{10em}}$$

Variance: The squared deviations.

$$\sigma^2 = \text{Var}(X) = \sum(x - \mu)^2 P(x) \rightarrow \sum(\text{value} - \text{expected})^2 \cdot P(\text{value})$$

Standard Deviation: $\sigma = SD(X) = \sqrt{\text{Var}(X)}$

Problems for Left Page

1. **A player pays you \$55 and draws a card from a deck. If he draws the ace of hearts, you pay him \$100. For any other ace, you pay \$10, and for any other heart, you pay \$5. If he draws anything else, he loses.**
 - a. Create a probability model for this policy (complete table by hand, then calculator)
 - b. Write a summary based on the expected cost and standard deviation. Would you play the game?

2. **Consider a dice game: no points for rolling a 1, 2, or 3; 5 points for rolling a 4 or 5; 50 points for a 6.**
 - a. Create a probability model to help calculate the expected values and variance. Write a brief summary
 - b. Imagine doubling the points awarded, what are the new mean and standard deviation?
 - c. Now imagine you just played the game twice. What are the mean and standard deviation of your total points?
 - d. Suppose you and a friend play the dice game. What are the mean and standard deviation of the difference in your winnings?